Ann. Natal Mus. Vol. 28(2) Pages 231–282 Pietermaritzburg December, 1987

A revision of Afrotropical *Setomima*, elucidation of their genealogical relationships and descriptions of other Afrotropical Psychodinae (Diptera: Psychodidae)

by

D. A. Duckhouse
(University of Adelaide, South Australia)

ABSTRACT

Using revised morphological terminology, descriptions are given of 4 new species of *Neoarisemus* Botosaneanu & Vaillant, 1 of *Tonnoiriella* Vaillant, 3 of *Setomima* Enderlein, and 1 each of *Elsahowia* Duckhouse, *Clogmia* Enderlein and *Clytocerus* Eaton. The following new genus groups are defined: *Setomima* subgenus *Ophryosetomima* subg. n. and *Mormia* Enderlein subgenus *Afromormia* subg. n. These taxa are placed in tribes, as named by Enderlein, that differ in composition from those recognised by other authors.

Setomima is redefined, using a series of new characters. The African species are revised, a key is provided, and the genealogical relationships of the genus are analysed. It is shown that this is a relatively primitive (cladistically basal) genus of Maruinini, outstanding for its structural diversity, and by virtue of its primitive characteristics, linked morphologically with *Alepia* Enderlein, *Neoarisemus* and *Paratelmatoscopus* Satchell, but not necessarily close to them genealogically. *Gerobrunettia* Quate & Quate is annectant between *Setomima* and *Brunettia* Annandale, and *Gerobrunettia, Brunettia* and *Mormia* (the Tribe Mormiini) form the apomorph sister group of *Setomima* and its immediate relatives in the Tribe Maruinini.

It appears that the furca of Paramormiini evolved from a 'ball-and-socket' articulation between gonocoxal apodemes and aedeagal apodeme, as seen in Maruinini.

The following taxonomic changes are included: *Satchelliella* Vaillant is a new subjective synonym of *Pneumia* Enderlein, *Krekiella* Vaillant and *Seoda* Enderlein are new subjective synonyms of *Telmatoscopus* subg. *Xenapates* Eaton (as used by Enderlein 1935 1937); Telmatoscopini Vaillant is a new synonym of Paramormiini Enderlein; Brunettiini Vaillant is a new synonym of Mormiini Enderlein; *Panimerus* subg. *Parapanimerus* Wagner is a subgenus of *Paramormia* Enderlein (new combination).

INTRODUCTION

The endemic non-phlebotomine Psychodidae of southern Africa are described by Duckhouse (1975 1978 1980 1985), and tropical African species mainly by Tonnoir (1920 1922 1939) and Satchell (1955*a*). Duckhouse & Lewis (1980) catalogue 122 non-phlebotomine and 130 phlebotomine species from the Afrotropical Region, and since 1980, four more non-phlebotomines have been described, giving a total of 126. However, the bulk of the Psychodinae-Psychodini are still not covered, and as this tribe is unusually prominent in the Afrotropics the fauna is more extensive than yet appears. The present paper analyses the genealogical relationships of *Setomima* Enderlein, describes new African species of this genus and reviews its other African species, southern and tropical. It also describes additional species of genera covered in earlier papers, over half from Africa south of latitude 15°S, the remainder more northerly.

The evidence gathered since Duckhouse (1975) first commented on the nature of the non-phlebotomine Afrotropical psychodid fauna supports my earlier view, that it is less diverse and far less endemic in character than the Neotropical fauna, but probably more or less equivalent to that of the Oriental Region. The Afrotropical fauna may have only about a quarter as many genera as that of the Neotropics and thus appears impoverished. Present indications are that it is dominated by four genera—*Neoarisemus, Setomima, Clytocerus* and *Psychoda*, all also occurring in other regions—and that the number of genera endemic to the Afrotropics is surprisingly small. I can only name *Eutonnoiria* Alexander, *Mystropsychoda* Duckhouse, *Elsahowia* Duckhouse and *Neomaruina* Vaillant. Nonetheless, in contrast with Chironomidae (Fittkau 1980), the total number of species and genera is probably as high as in the western Palaearctic. Also in contrast with Fittkau's observations on chironomids and Stuckenberg's (1962) on palaeogenic invertebrates in southern Africa, phylogenetically old taxa are not necessarily restricted to high altitudes or temperate regions in the south. As noted by Duckhouse (1980), they commonly extend into the tropics. This is true of *Elsahowia, Neoarisemus* and *Setomima*. Indeed, *Setomima*, apparently one of the most plesiomorphic of Psychodinae, is predominantly tropical.

MATERIAL AND METHODS

Preparation and storage of psychodids for taxonomic work

Most workers describe psychodids from specimens mounted without first dissecting the genitalia, which is unsatisfactory. Earlier workers (Tonnoir, Satchell, Quate) routinely separated the epandrium and its appendages from the hypandrium, gonopods and aedeagus. This is easily done by cutting the hypandrium on either side, at or above the level of the gonocoxal apodemes, and severing any connection between ventral epandrial plate and gonocoxal apodemes. If the dissected parts are then mounted symmetrically without compression between two pieces of coverslip, they may be examined in both dorsal and ventral view and the resultant preparation may afterwards be attached to the slide. It is impossible to determine structure accurately using whole mounts, and errors and oversimplified descriptions are inevitable. The same argument applies to female specimens: the subgenital plate and spermathecal complex cannot be clearly seen unless separated from the ninth tergite and cerci.

Type specimens should be mounted on slides in a tried and tested permanent mountant such as Canada Balsam or Euparal. They should not be stored in alcohol: such specimens fade and undergo other changes that make it progressively harder to see structural details or make permanent preparations.

Note on measurement of female subgenital plate

The length of the female subgenital plate is measured from middle of anterior margin of basal thickening to level of tips of apical lobes; the width is the greatest width, at whatever level.

TERMS USED IN DESCRIPTIVE MORPHOLOGY

In this paper I have adopted changes in terminology to bring Psychodidae more in line with other families, and also added new terms, as follows:

Head region. The antennal flagellum is secondarily annulated to form 14 *flagellomeres* ('flagellar segments' of previous papers).

Wing. I follow Hennig (1973) and McAlpine (1981) in regarding M as 3-branched: M_4 of previous publications is now CuA_1 and Cu is CuA_2. The two basal cells are the *basal radial* (previously first basal) and *basal medial* (second basal). Adopting Wootton's (1979) recommendation, the alula or neala is now the *jugum*.

Male terminalia. The strap-like 9th sternite is the *hypandrium*. The base of the phallus sheath is often sclerotised to form a *post-hypandrial plate* (aedeagal bridge of previous papers). This is placed behind the hypandrium, with which it sometimes fuses. The 9th tergite is the *epandrium*, and on its dorsal (before rotation, ventral) surface is a complex sclerite, the *ventral epandrial plate*. The ventral epandrial plate articulates posteriorly with cercopods and 10th tergite; anteriorly it is often attached to the gonocoxal apodemes.

The *gonopods* (forceps) may be elaborated in various ways by the development of secondary processes, especially in Trichomyiinae. In Psychodinae, the base of the coxite is sometimes extended dorsally as a *parabasal process*, running towards the midline, usually in the plane of the hypandrium or slightly below. Ventrally, the medial margins of the coxites are produced to form paired *gonocoxal apodemes*, often broad and plate-like, meeting beneath the aedeagal apodeme. In Maruinini, where they meet they are pushed upwards as a pair of lip-like flanges. The flanges diverge to form a structure appearing in dorsal view as a medially divided hemisphere, the 'ball', that fits into a corresponding concavity, the 'socket', on the underside of the aedeagal apodeme. In Paramormiini the ball is apparently transformed into a V-shaped structure, the *furca*, the tips of whose arms articulate with the thickened lateral margins of the aedeagal apodeme (see discussion of *Elsahowia)*.

LOCATION OF TYPES

Holotypes of all new species, now in my personal collection, will be deposited in the Natal Museum.

ACKNOWLEDGEMENTS

I am grateful to Drs B. R. Stuckenberg and J. Londt for valuable criticism; to Mrs Ruth Evans for expertly stippling 16 of my diagrams of terminalia and for drawing the diagram showing genealogical relationships; to Mr Philip Kempster for preparing photographs of the figures; to my wife and Mrs Lorna Lucas for typing drafts and final typescript respectively; and to the following for the gift or loan of specimens: Dr David G. Young, University of Florida; Dr Paul H. Arnaud, Jr., California Academy of Sciences; Dr Brian Stuckenberg, Natal Museum; the Trustees of the British Museum (Natural History).

DESCRIPTIONS OF TAXA

In this paper it has been convenient to refer to tribal groupings, using names originally proposed by Enderlein (1935 1937). These differ in composition from the tribes employed by Vaillant in his classification of Palaearctic Psychodidae (Vaillant 1971–1983), several of which he wrongly describes as new.

Tribe Pericomini

Pericomini Enderlein, 1935: 246.

Genera with flagellomeres barrel-shaped and ascoids small, paired and digitate, and whose male genital apodemes do not form a 'ball-and-socket' articulation as in Maruinini. R fork usually at almost same level as M fork, or beyond, and stem of R fork usually arising at or before apex of basal radial cell.

Vaillant (1971–1983) forms five new genus groups by splitting *Pericoma* Walker. Wagner (1982) says one of these, *Satchelliella* Vaillant, type-species *Pericoma mutua* Eaton, is a subjective synonym of *Pericomina* Enderlein, 1937, because it contains *Pericoma opaca* Tonnoir, the type-species of *Pericomina.* I concur with Vaillant's (1982*a*) opinion (a revision of his earlier view) that *opaca* is not a species of *Satchelliella* but of *Ulomyia* Walker, and consider that this synonymy is therefore incorrect. However, *Satchelliella* also contains the type-species of *Pneumia* Enderlein, *Pericoma palustris* Meigen. *Pneumia* was proposed by Enderlein (1935 1937) and *Satchelliella* is therefore a subjective synonym of *Pneumia*, **syn. n.** *Pneumia* was proposed 2 years before *Pericomina*, so whether *opaca* is put in *Satchelliella* or not, *Pneumia* is the valid name.

The Pericomini form a major part of the psychodid fauna of the Holarctic, including North Africa. Surprisingly they are almost unknown from the Afrotropical Region, where the only representatives are a species of *Notiocharis* in Zaïre and one on the Seychelles. This is a striking faunal discontinuity. One possible reason is that *Neoarisemus* (Tribe Maruinini) is long established, speciose and successful in the Afrotropics and has breeding habits similar to those of Pericomini, which are thus excluded: Duckhouse (1978) describes the stream-dwelling larva of *N. prodigiosus*, which 'quite closely resembles' that of *Pericoma fallax* Eaton; Wagner (1979) records *N. fuscus* as emerging from a tropical mountain stream at Kalengo, Zaïre, and Quate (1955) collected a pupa of *N. niger* (Banks) from the margins of a Nearctic stream.

Tribe Maruinini

Maruinini Enderlein, 1937: 109, 110.

R fork generally before M fork and both placed rather basally, so that the veins beyond look long and straight and R_2 is several times as long as R_{2+3}; flagellomeres primitively barrel-shaped and narrower than scape and pedicel, or if flask-shaped flag. 1 usually retains its barrel shape. Ascoids frequently larger than in Pericomini, or branched.

Aedeagal apodeme broad, dorsoventral. Gonocoxal apodemes large, with median dorsal structure, often ball-like in dorsal view, fitting into concavity on underside of aedeagal apodeme, giving 'ball-and-socket' appearance.

The Maruinini is a massive tribe, basically southern hemisphere in distribution, with relatively small extensions into the Holarctic. In the Afrotropics it is represented by *Setomima, Neoarisemus* and *Tonnoiriella.* All three are unusual but not unique among Maruinini in having multiretinaculate cercopods and generally ventral hair scars on the epandrium. *Setomima* and *Neoarisemus* also have an internal sclerotised collar at the distal end of the pedicel (Fig. 41). However, these features are plesiomorphisms and so cannot be used to separate the three from other Maruinini.

Genus *Neoarisemus* Botosaneanu & Vaillant

Neoarisemus Botosaneanu & Vaillant, 1970: 178.

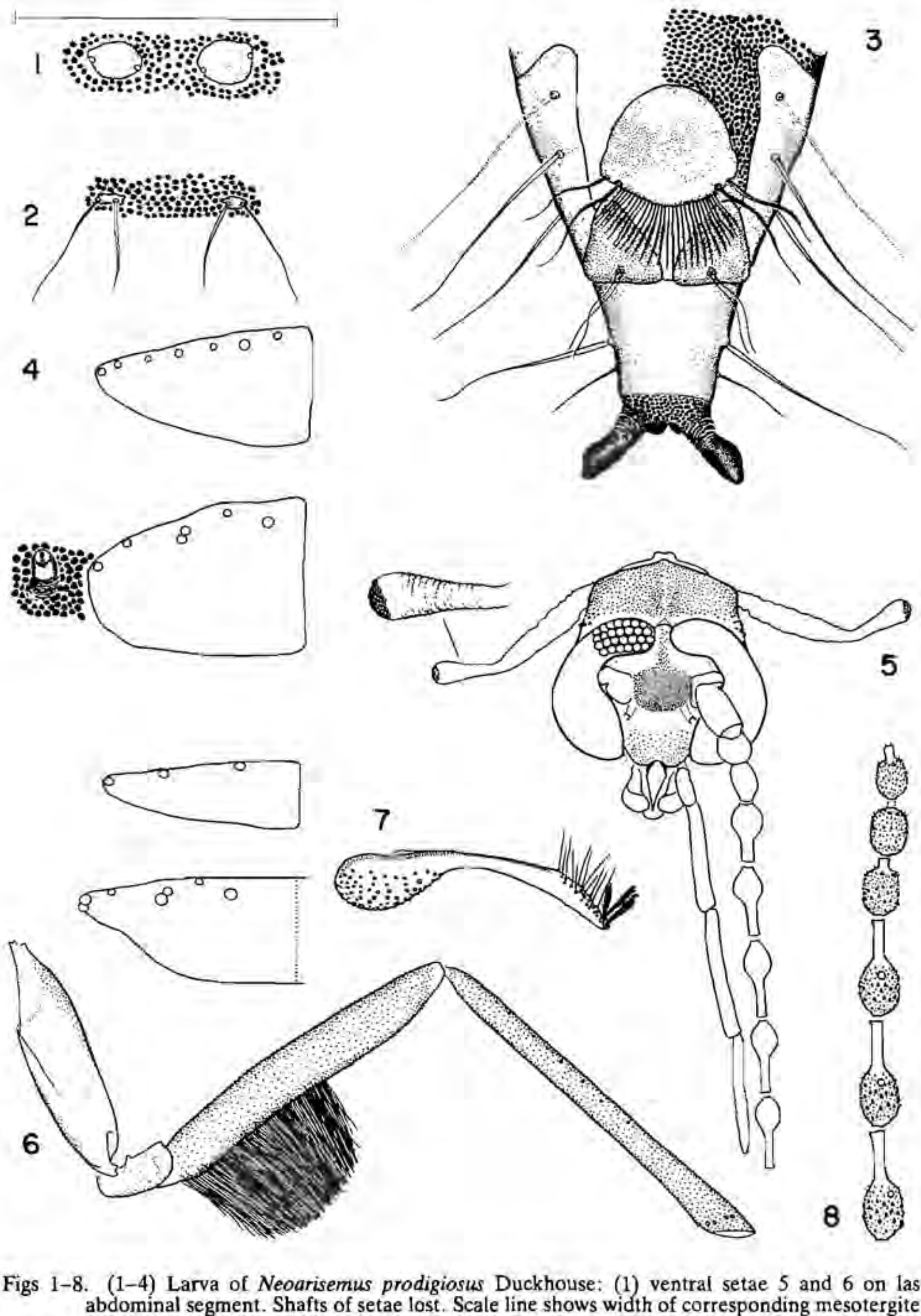
This primarily African genus, originally known from 3 Ugandan species, was shown by Duckhouse (1978) to include 10 species in South Africa. Subsequently, Wagner (1979) recorded the Ugandan *Neoarisemus fuscus* (Tonnoir) (wrongly described as a new combination) as emerging from a stream in Zaïre, but I doubt that Wagner's species is truly *fuscus*. Its genitalia appear to be far less stoutly constructed, with slender spines at the tip of the style, and the cercopod is shown with a row of 6 small feathered retinacula in place of the 4 larger feathered retinacula of *fuscus*. Two species have also been recorded from Spain and Sardinia (Wagner 1978, Wagner & Salamanna 1984). These are the first *Neoarisemus* from the western Palaearctic, but neither is described in enough detail to allow determination of affinities. The Spanish *N. ibericus* Wagner is the sister species of the Sardinian *N. sardous* Wagner & Salamanna, linked by the presence of a pair of male allurement organs in lateral folds of the 8th abdominal segment, and by 'rake-shaped' ascoids. They also have a barrel-shaped 1st flagellomere, figured by Wagner & Salamanna as separate from the 2nd, although Wagner says of *ibericus* that the 1st and 2nd flagellomeres tend to fuse. Apomorphic fusion between these flagellomeres occurs in the *Neoarisemus* of Japan and North America, but not Africa and Afghanistan. Wagner & Salamanna say *sardous* has ascoids on the 12th flagellomere, as in the African *impeditus* Duckhouse and *brevicornis* Duckhouse. In the Japanese and N. American species, otherwise more apomorphic, they occur up to the 13th, which is a more plesiomorphic state.

Duckhouse (1978) concludes that the African species appear to be more plesiomorphic overall than the few non-African *Neoarisemus*, but it seems that the new European species may be as plesiomorphic as the African. Possibly this line reached Europe from Africa in the Caenozoic.

My description of the larva of *Neoarisemus* (Duckhouse 1978) is incomplete, being based on the crumpled exuviae of one male and one female of *N. prodigiosus* Duckhouse from Cape Province, reared and mounted by G. H. Satchell. After re-examining this material I add the following observations:

The ventral surface, which is very broken, shows setae 5 and 6 to be placed on opposite margins of a single large plate (Fig. 1), an apomorphism independently evolved in some Pericomini and Paramormiini; setae 16 and 17 are also on a single plate, very small in size (Fig. 2). The lateroanal plates are secondarily fused with the siphonal plate (Fig. 3), an apomorphism also seen in species of several other genera, listed by Duckhouse (1985), in each of which it evolved independently. Thorax with respiratory horns raised on short stalks. Chaetotaxy of thoracic tergites (Fig. 4) consistent with most other features, except that the two most lateral setae on both the prothoracic mesotergite and the prothoracic metatergite are widely separated instead of forming closely united pairs. Head capsule without denticles, almost smooth, frontal sutures subtending angle of about 45°; antennae and mouthparts of type seen in more generalised species, eg. *Pericoma trivialis* Eaton, or in *P. fallax* Eaton; condition of hypostomium not discernible.

One undoubtedly peculiar feature of this larva is the presence of 4 pairs of true setae on the dorsal side of the siphonal plate, in place of the 2 pairs of other



Figs 1–8. (1–4) Larva of *Neoarisemus prodigiosus* Duckhouse: (1) ventral setae 5 and 6 on last abdominal segment. Shafts of setae lost. Scale line shows width of corresponding mesotergite; (2) ventral setae 16 and 17, to same scale as previous figure; (3) ventral view of siphon, position of preanal plate reconstructed; (4) dorsal view of pro- and mesothoracic tergites, LHS. (5–7) Male of *Neoarisemus angularis* sp. n.: (5) head, with inset showing apex of corniculum; (6) basal segments of foreleg; (7) cercopod, lateral. (8) Female of *Neoarisemus angularis*, last six flagellomeres.

Psychodinae: a very small pair posteriorly, 2 pairs very close-set about midway from base to tip, and a large pair anteriorly.

The African *Neoarisemus* are obviously interrelated, 'yet so diversified that the genus is probably one of the more ancient elements in the African fauna' (Duckhouse 1978). Male terminalia are rather constant throughout, but head, cephalic allurement organs and antennae vary greatly. Here I describe 2 new species from South Africa related to *N. satchelli* Duckhouse, and 2 new Tanzanian species, *youngi* and *brunneus*.

At a late stage in the preparation of this paper I discovered that *Neoarisemus* species agree with *Setomima* in that the pedicel is provided with an additional internal sclerotised collar (see discussion under *Setomima*).

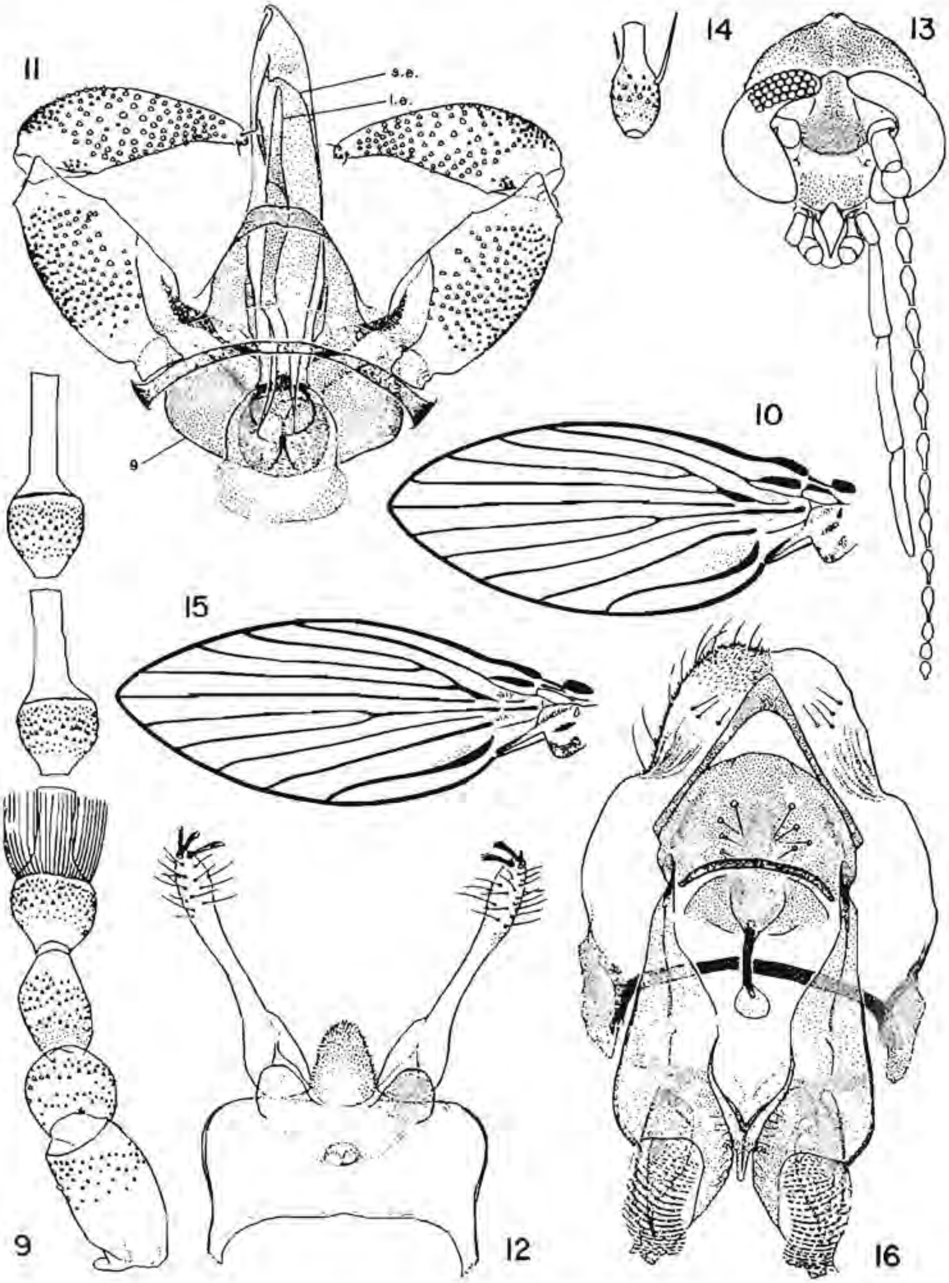
Neoarisemus angularis sp. n.

Related to *satchelli* Duckhouse but more robust; wing broader and with some hair on membrane in basal region; head produced to form angular lateral prominences in region of insertion of cornicula. Female distinguished from *satchelli* and *tapetipennis* Duckhouse by shape of basal region of head and details of genitalic structure. Vestiture mainly lost, apparently very dark.

Male. Head (Fig. 5) about 0,96 times as broad as long. Vertex long and angular, having pair of obtuse prominences adjacent to points of insertion of cornicula; scars dense, indistinctly divided along median line and denser on either side, larger behind postocular scars. Occipital flange drawn out to form stout bilobed median knob. Cornicula with sclerotised apical bulb no larger than in *satchelli* but base drawn out as long membranous stalk; apical pits more numerous than in *satchelli*, without clear central papillae. Eyebridges separated by about 2,2 facet diameters, interocular suture variable. Frontal scar patch undivided; median extension not reaching level of suture. Anterior tentorial tube broad; sclerotised rim around opening, connected to eye by line of sclerotisation as seen in some *Setomima* species. Palpi (1,0–3,6–4,1–3,7) very long, about 1,84 times length of head; 4th segment shorter than 3rd. Antennae (Fig. 9) similar to *satchelli* but scape longer and post-pedicel stouter; apical half missing in all ♂, but presumably with last 3 flagellomeres diminutive, essentially as in ♂ *satchelli* and ♀ of this species; flagellomeres 2–6 almost amphora-shaped with rows of fine digitate ascoids arising from shallow grooves at apex of basal bulb.

Prothorax with dorsolateral scar patches small (about 20 scars each). Wing (Fig. 10) about 2,3 times as long as broad, somewhat broader than *satchelli*, especially in cubital region; CuA_2 strongly thickened and arched at base; R_{2+3+4} exceptionally stout; some hair on membrane anterior to basal half of CuA_2 and in region of basal cells; membrane infuscated in places, conspicuous unsclerotised hair-line along anterior edge of Sc, which is stout. Winglength 2,3–2,5 mm. Forefemur with massive brush of black hair on underside in basal half (Fig. 6).

Terminalia (Figs 7, 11–12) similar to *satchelli*. Gonopods held horizontally, strongly elbowed; style very stout, exceptionally convex on outer side and with dense hair scars extending nearly to tip; tip broad, slightly beaked, with conspicuous pair of short sensory setae on upper side. Hypandrium narrow, more



Figs 9–19. (9–12) Male of *Neoarisemus angularis* sp. n.: (9) base of antenna; (10) wing, stippling showing distribution of hair scars; (11) forceps and aedeagus (*g*, gonocoxal apodemes; *l.e.*, lateral element; *s.e.*, internal sclerotised element); (12) epandrium and cercopods. (13–16) Female of *Neoarisemus angularis*: (13) head; (14) 2nd flagellomere; (15) wing, stippling showing distribution of hair scars; (16) genitalia.

sharply defined than *satchelli*; pair of vestigial sensory setae present; lateral grooves between hypandrium and bases of coxites indistinct; hypandrium linked to posthypandrial plate by microsetose membrane. Aedeagus narrower distally than in *satchelli*, tapered to blunt point; internal sclerotised element (Fig. 11, *s.e.*) with broad rounded lobe on one side and acute point on other; lateral element (Fig. 11, *l.e.*) narrower and more rounded apically than *satchelli*; aedeagal apodeme broad and rounded anteriorly. Gonocoxal apodemes (Fig. 11, *g*) broadened anteriorly and thus almost parallel-sided. Epandrium (Fig. 12) far broader than long, quadrate, ventral setae as *satchelli*; pseudospiracular openings close-set or fused. Cercopods long and slender, central half conspicuously narrowed in dorsal view.

Female. Head (Fig. 13) without cornicular or lateral protuberances; similar to *satchelli* but eyebridges connected by low poorly sclerotised cuticular arch, without median prolongation posteriorly; frontal scar patch not noticeably cleft anteriorly. Antennae 0,47 times length of wing; 14 flagellomeres, flag. 2 as in Fig. 14; last 3 flagellomeres (Fig. 8) reduced, as in *satchelli*.

Wing (Fig. 15) not abnormally narrow, about 2,6 times as long as broad. Compared with ♂, fewer scars on membrane, CuA_2 less arched basally and R_{2+3+4} less stout. Winglength 2,2 mm. Fore-femur without tuft.

Terminalia with subgenital plate (Fig. 16) about 0,91 times as long as broad; differing from *satchelli* as follows: Dorsal flap more acute; genital sac larger and meeting sides of dorsal flap, not noticeably notched posteriorly, less arched anteriorly; median plate with basal region not parallel-sided but strongly tapered, almost triangular and distal region more enlarged anteriorly; no discernible tenuous plate between apodemes and hence no foramen; spermathecal sculpturing far more extensive.

Material examined: Holotype ♂, SOUTH AFRICA, Cape Province, Garden of Eden, forest, 342/3AA (Stuckenberg & Londt). Paratypes: 8♂, 1♀ (allotype) and 2 other ♀s, with holotype.

Neoarisemus pristinus sp. n.

Related to *satchelli* but less robust; antenna with only 13 flagellomeres; wing exceptionally narrow; head with vertex longer, less obtuse, without cornicula but dorsal surface with 2 rounded patches of structures resembling those at tips of typical cornicula. Female distinguished from *satchelli*, *angularis* and *tapetipennis* by shape of basal region of head and details of genital structure.

Male. Head (Fig. 17) about as long as broad. Vertex long and rounded, sides curved; scars sparse; basal region lacking scars but with paired allurement organs consisting of structures, each with central knob, resembling those at tips of cornicula in *satchelli*, but raised (Fig. 18). Occipital flange with notch and Y-shaped cuticularisation (Fig. 19). No cornicula. Eyebridges reduced, tapered medially, widely separated by about 5,0 facet diameters, connected by arched cuticular thickening. Frontal scar patch undivided; median extension reaching cuticular thickening at level of second facet row. Anterior tentorial tubes narrow. Palpi (1,0–2,6–3,0–3,7) about 1,4 times length of head. Antennae about 0,64 times length of wing; only 13 flagellomeres, last 2 diminutive; flagellomeres 2–11 flask-shaped, each with 2 small groups of fine digitate ascoids (single ascoids with branches?) arising from very short grooves at apex of basal bulb (Fig. 20).

Prothorax with dorsolateral scar patches larger than in *angularis* (about 35 scars each). Wing (Fig. 21) very narrow and acutely pointed, only about 3,4 times as long as broad; CuA_2 strongly thickened at base, not arched; membrane not noticeably infuscated and without hair. Winglength 2,0–2,1 mm. Fore-femur without brush.

Terminalia (Figs 22–24) similar to *satchelli* and *angularis*. Style relatively slender and with fewer scars; tip more strongly beaked. Hypandrium broad; lateral grooves between hypandrium and bases of coxites well-defined; no microsetose membrane. Aedeagus similar to *satchelli*; internal sclerotised element (Fig. 22, *s.e.*) with step on one side and point on other; aedeagal apodeme broad and rounded anteriorly. Gonocoxal apodemes (Fig. 22, *g*) tapered anteriorly. Epandrium similar to *satchelli* but bulging laterally; no ventral setae; sclerites at bases of cercopods rounded, separated from triangular median sclerite. Cercopods short and stout, very similar to *satchelli*.

Female. Head (Fig. 25) similar to ♂ but without specialised areas at base; vertex far longer and more nearly acute than in *satchelli* or *angularis*. Eyebridges separated by 5,0 facet diameters, connected by arched zone where cuticle is almost unsclerotised; no median prolongation. Frontal scar patch not cleft anteriorly. Antennae 0,4 times length of wing; only 13 flagellomeres, last 2 diminutive, as in *satchelli*; flagellomere 5 as in Fig. 26.

Wing as in ♂ and thus far narrower than *satchelli* or *angularis*: 3,4 times as long as broad. Winglength 2,05 mm.

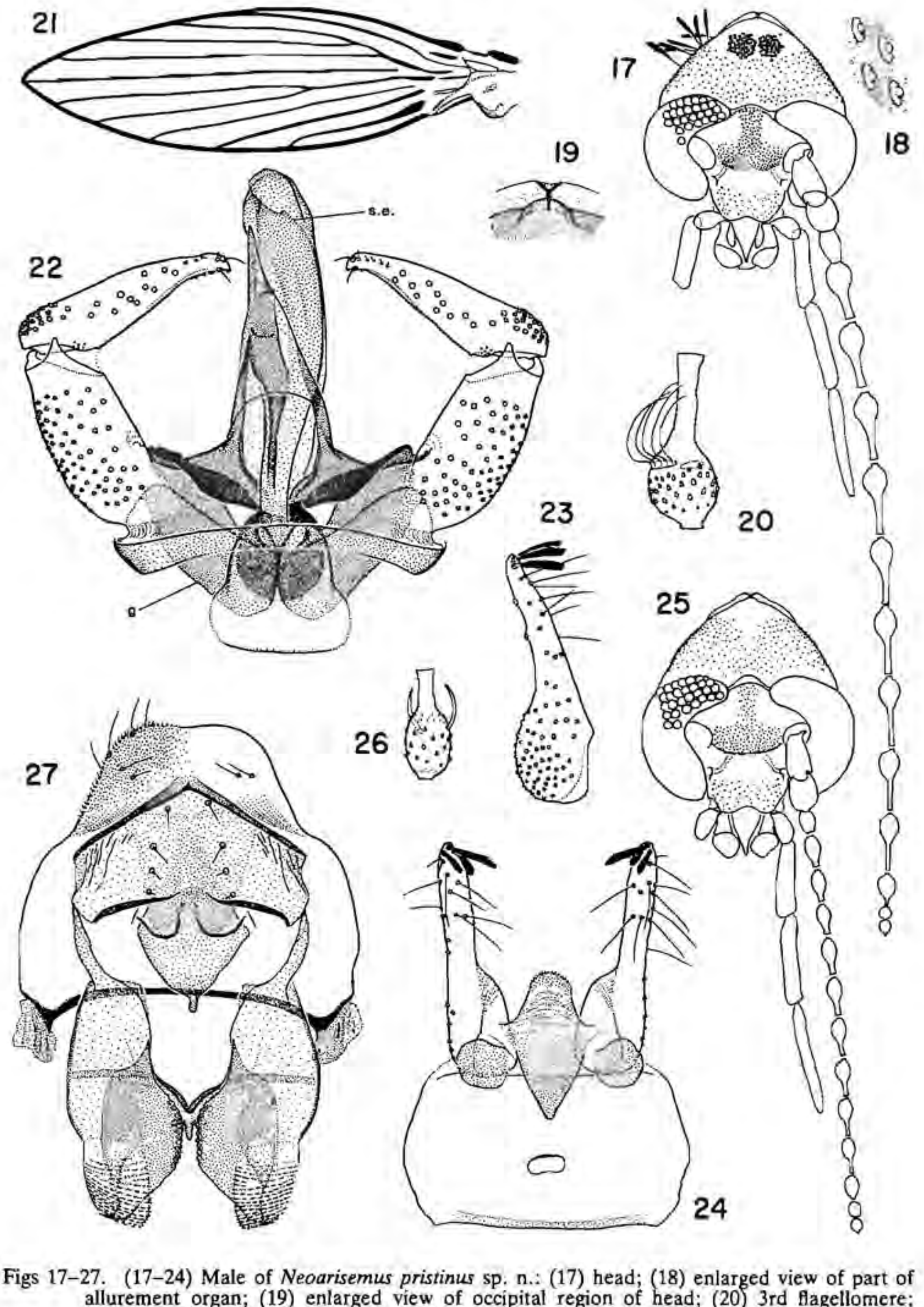
Terminalia differing from *satchelli* and *angularis* as follows: Subgenital plate (Fig. 27) squat, only 0,8 times as long as broad; distal lobes short and strongly tapered, each with only 2 sensory setae dorsally. Dorsal flap strongly obtuse; genital sac large, meeting sides of dorsal flap, even broader than *angularis*, anterior sclerotised rim tapered on each side towards median gap; anterior region of median plate broad and triangular, distal region reduced to short knob; no discernible tenuous plate or foramen between apodemes; spermathecal sculpturing more extensive than *satchelli* but weaker than *angularis*.

Material examined: Holotype ♂, SOUTH AFRICA, Natal, Pietermaritzburg, Town Bush, Malaise trap, ix. 1976 (Miller). Paratypes: 1♂, 1♀ (allotype), with holotype.

Neoarisemus youngi sp. n.

This Tanzanian species agrees with the *satchelli* group in its ascoids but has poorly sclerotised and structurally divergent male terminalia. Male cephalic allurement organs sessile, not as in *pristinus* but located ventrolaterally, close behind the eyes, as in *brunneus* sp. n. (Fig. 35).

Male. Head (Fig. 28) about 0,76 times as long as broad. Vertex short, with rounded lateral prominences behind eyes; ventrolateral allurement organs extending onto these prominences; scars distinctly separated along median line. Occipital region very obtuse, bilobed, and occipital foramen on ventral surface displaced anteriorly,



Figs 17–27. (17–24) Male of *Neoarisemus pristinus* sp. n.: (17) head; (18) enlarged view of part of allurement organ; (19) enlarged view of occipital region of head; (20) 3rd flagellomere; (21) wing; (22) forceps and aedeagus (*g*, gonocoxal apodemes; *s.e.*, internal sclerotised element); (23) cercopod, lateral; (24) epandrium and cercopods. (25–27) Female of *Neoarisemus pristinus*: (25) head; (26) 5th flagellomere; (27) genitalia.

giving abnormally broad posterior rim; median thickening extending onto ventral surface but not reaching rim of foramen, structure otherwise essentially as in *brunneus* (Fig. 35). Eyebridges tapered medially, separated by about 2,6 facet diameters, connected by arched interocular suture. Frontal scar patch very broad, divided by median scar-free band, broad posterior extension to level of posterior facet row. Fronto-clypeal suture broad, dark, with median spur. Palpi (1,0–2,3–2,5–3,0) about 1,5 times length of head. Antennae (Figs 28–30) long and stout: about 4,5 times length of head and 0,75 times length of wing. Scape long, cylindrical, and basal articulatory process slender; pedicel reaching well beyond level of eyes; postpedicel elongate barrel-shaped, longer than pedicel; basal flagellomeres with bulbs broad; rows of fine digitate ascoids inserted in conspicuous slit-like unsclerotised areas, one on either side of bulb, on flagellomere 2 running diagonally; distal flagellomeres less stoutly constructed but necks long up to and including 11th, whose neck is shorter than those of preceding flagellomeres but still about equal to basal bulb; last 3 flagellomeres diminutive, subequal, last with small apiculus, about as long as broad.

Prothorax with dorsolateral scar patches comparable in size with those of *pristinus*. Wing almost identical with *brunneus* (Fig. 36): about 2,6 times as long as broad, obtusely pointed; CuA_2 strongly thickened at base, not arched; membrane without hair. Winglength 1,9–2,1 mm. Fore-femur arched upwards distally.

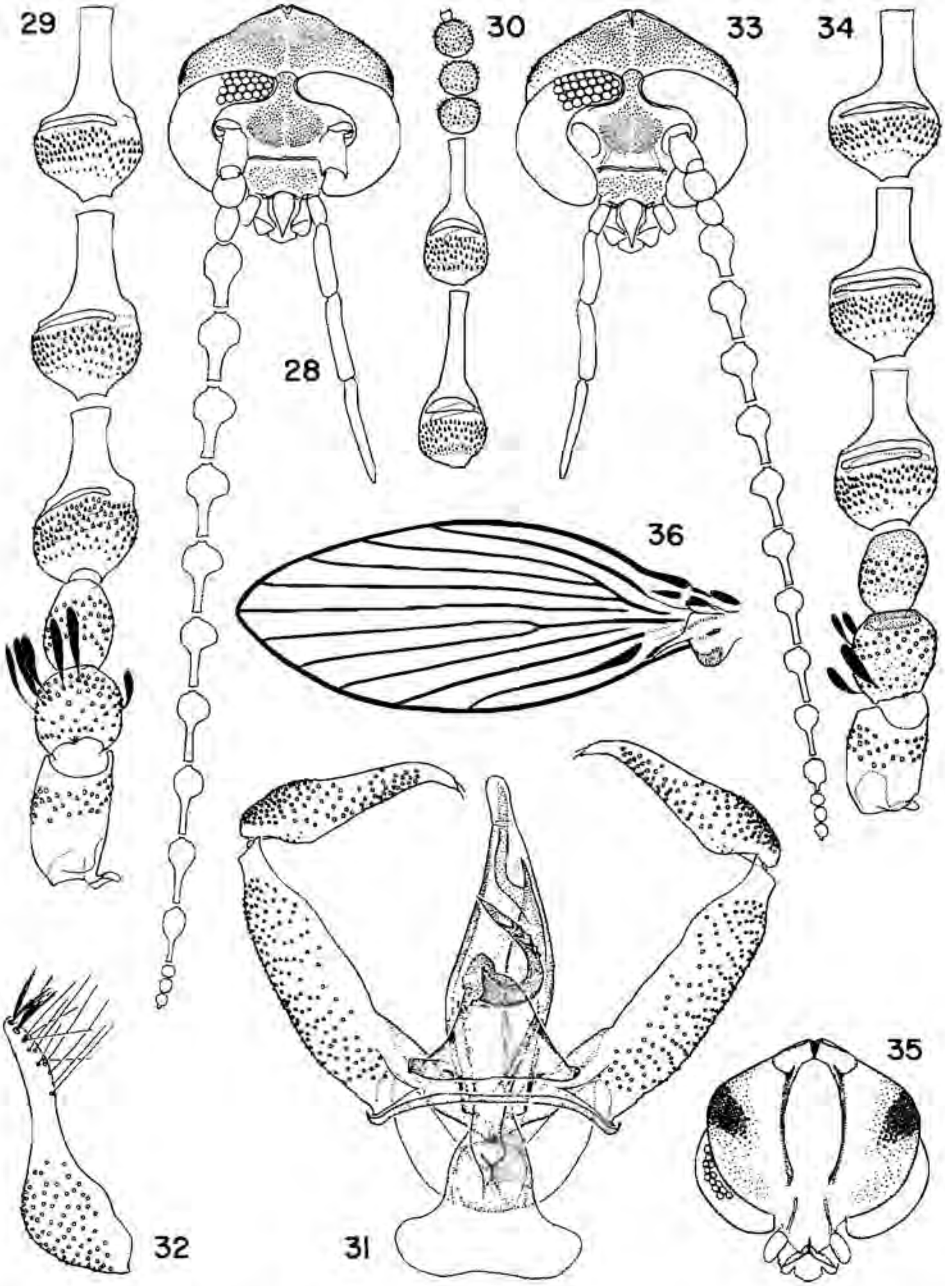
Terminalia (Figs 31–32) divergent in structure, lightly sclerotised, yellowish. Gonopods close-set. Coxite exceptionally long, slender. Style hooked, with 2 terminal setae, one apical, one on upper margin; hair scars numerous—on inner side reaching more than three-quarters way to tip. Hypandrium very narrow. Aedeagus strongly tapered to narrow terminal knob, transversely wrinkled at base; internal sclerotised element bifurcated to form long slender process curving backwards just beyond base and ending inside terminal knob, and short spiniform process (homologue of step, point or process in this position in most other species). Lateral element strongly uncinate, barbed. Aedeagal apodeme with large lateral wings. Gonocoxal apodemes almost semicircular in outline. Epandrium slightly broader than long, quadrate, lacking ventral scars or setae; pseudospiracular openings fused. Tenth tergite very broad, nearly half width of epandrium. Cercopod, Fig. 32: swollen basal region larger than in other species of group, in dorsal view constricted abruptly just before midpoint to narrow parallel-sided distal half.

Material examined: Holotype ♂, TANZANIA, 6,5 miles S of Morogoro, 490 m, wet forest, flight trap, 26–27.xi.1982 (D. G. Young). Paratypes: 4♂, with holotype. All specimens on slides.

Neoarisemus brunneus sp. n.

Tanzanian sister species of *youngi*, differing mainly in proportions of antennae and far greater sclerotisation of terminalia, which are thus brown rather than yellowish.

Male. Head (Fig. 33) 0,85 times as long as broad. Eyebridges more heavily constructed, antennal insertion areas more narrowly separated, clypeus narrower,



Figs 28–36. (28–32) Male of *Neoarisemus youngi* sp. n.: (28) head; (29) base and (30) tip of antenna; (31) forceps and aedeagus; (32) cercopod, lateral. (33–36) Male of *Neoarisemus brunneus* sp. n.: (33) head; (34) base of antenna; (35) ventral view of head; (36) wing.

and frontal scar patch narrower, than in *youngi*. Eyebridges separated by 1,8 facet diameters. Ventral view of head as in Fig. 35; median thickening extending onto ventral surface, longer than in *youngi* and reaching rim of foramen. Palpi (1,0–2,3–2,5–3,1) 1,4 times length of head. Antennae (Figs 33–34) shorter and less stoutly constructed than in *youngi*: only 3,6 times length of head and 0,7 times length of wing. Scape short, cylindrical, with short basal articulatory process; pedicel not reaching beyond level of eyes; postpedicel proportionately shorter than in *youngi*, about as long as pedicel; basal flagellomeres with ascoids in slit-like unsclerotised areas, on flagellomere 2 running transversely. Neck of flagellomere 11 far shorter than in *youngi*, only 0,31 times length of basal bulb.

Wing (Fig. 36) 2,8 times as long as broad. Winglength 2,0 mm. Fore-femur normal in form, not arched upwards distally as in *youngi*.

Terminalia heavily sclerotised, brown. Aedeagus broader than in *youngi*; lateral element more slender, barbs vestigial. Epandrium about twice as broad as long. Tenth tergite normal in width, just over quarter width of epandrium.

Material examined: Holotype ♂, TANZANIA, 6,5 miles S of Morogoro, 490 m, wet forest, flight trap, 26–27.xi.1982 (D. G. Young).

Genus *Tonnoiriella* Vaillant

Tonnoiriella Vaillant, 1971: 38. Type-species: *Pericoma pulchra* Eaton, 1893, by indication (ICZN, 1985, Art. 68 (d)).

Tonnoiriella, the '*pulchra* group' of Duckhouse (1975), consists of 3 South African species and over 10 in the Palaearctic. These share a series of features with the southern pericomoid taxa placed here in the Tribe Maruinini.

It has long been recognised that southern pericomoids have little in common with *Pericoma* Walker (Duckhouse 1966) but I have delayed defining new genera for them: Few adults of this massive group are described, their larvae are often extraordinarily similar to Palaearctic forms, and in the Neotropics there are species that appear to be intermediate between Maruinini and Pericomini. Nonetheless, as recognised by Duckhouse (1975) the distinctive *pulchra* group could have been named without difficulty. Vaillant (1971) had, in fact, already named *Tonnoiriella* for this group, but without defining it or designating a type-species. Contrary to my view that it was therefore not an available name (Duckhouse 1980) I now recognise that *pulchra* was mentioned incidentally by him in 1971 as a species of *Tonnoiriella* and thus became 'type by indication' (ICZN, 1985, Art. 68 (d)). In the same paper Vaillant classified *Tonnoiriella* in the Pericomini, but the features that seem to link *Tonnoiriella* with Pericomini are plesiomorphic at the genus level and thus provide no evidence of affinity. Vaillant (1982*a*) now places *Tonnoiriella* with *Setomima* in a new tribe, the Setomimini, here treated as part of the Maruinini. *Tonnoiriella* shares conspicuous plesiomorphic features with *Setomima*, but no apomorphisms that suggest a closer relationship than is indicated by placing both in Maruinini.

Tonnoiriella cracens sp. n.

Similar to *drepanopenis* Duckhouse, but styles long and slender, distal element of aedeagus not sickle-shaped, and hypandrium with median process parallel-sided (tongue-shaped), not triangular.

Male. Head (Fig. 38) 0,9 times as long as broad, differing from *drepanopenis* in distribution of scars on vertex, which are less concentrated medially; no scar-free median band. Interocular suture forming complete arch. Frontal scar patch less divided than in *drepanopenis*; wide separation between frontal scar patch and fronto-clypeal suture. Palpi (1,0–1,4–1,5–2,8) 1,3 times length of head, without hyaline sensory rods. Antenna with 14 flagellomeres, only 1,43 times length of palp and 0,33 times length of wing; scape only 0,8 times length of pedicel, encircled by single line of scars. Pair of short curled digitate ascoids on flagellomeres 5–11; last three flagellomeres (12–14) reduced, 0,4, 0,4 and 0,48 times length of pedicel, without ascoids; flag. 14 is 1,2 times length of flag. 13; apiculus about 0,3 times length of basal bulb, very broad, encircled at base by ring of scars.

Wing 2,85 times as long as broad; venation essentially as in *drepanopenis*. Winglength 1,7 mm.

Terminalia, Fig. 37. Style slender compared with *drepanopenis*, especially at tip. Distal piece of aedeagal complex much less strongly curved than in *drepanopenis*: not sickle-shaped, its base forming acute triangular process. Aedeagal apodeme parallel-sided, terminating anteriorly in sclerotised rim and apical spine. Coxites with triangular parabasal processes, tips concealed beneath median lobe of hypandrium. Gonocoxal apodemes forming pair of triangular projections anteriorly; medial margins sclerotised, converging to point between bases of coxites, giving rise to darkly sclerotised structure reminiscent of tuning fork, fitting into concavity on ventral side of aedeagal apodeme. Hypandrium with parallel-sided tongue-shaped enlargement on posterior margin, above 'tuning fork'. Epandrium with pair of pseudospiracular openings adjacent to basal thickening; ventral hair scars in two widely separated groups posteriorly. Cercopods as in *drepanopenis*.

Material examined: Holotype ♂, SOUTH AFRICA, Natal, Cathedral Peak, Malaise trap, 18–21.xii.1979 (B. Lamoral).

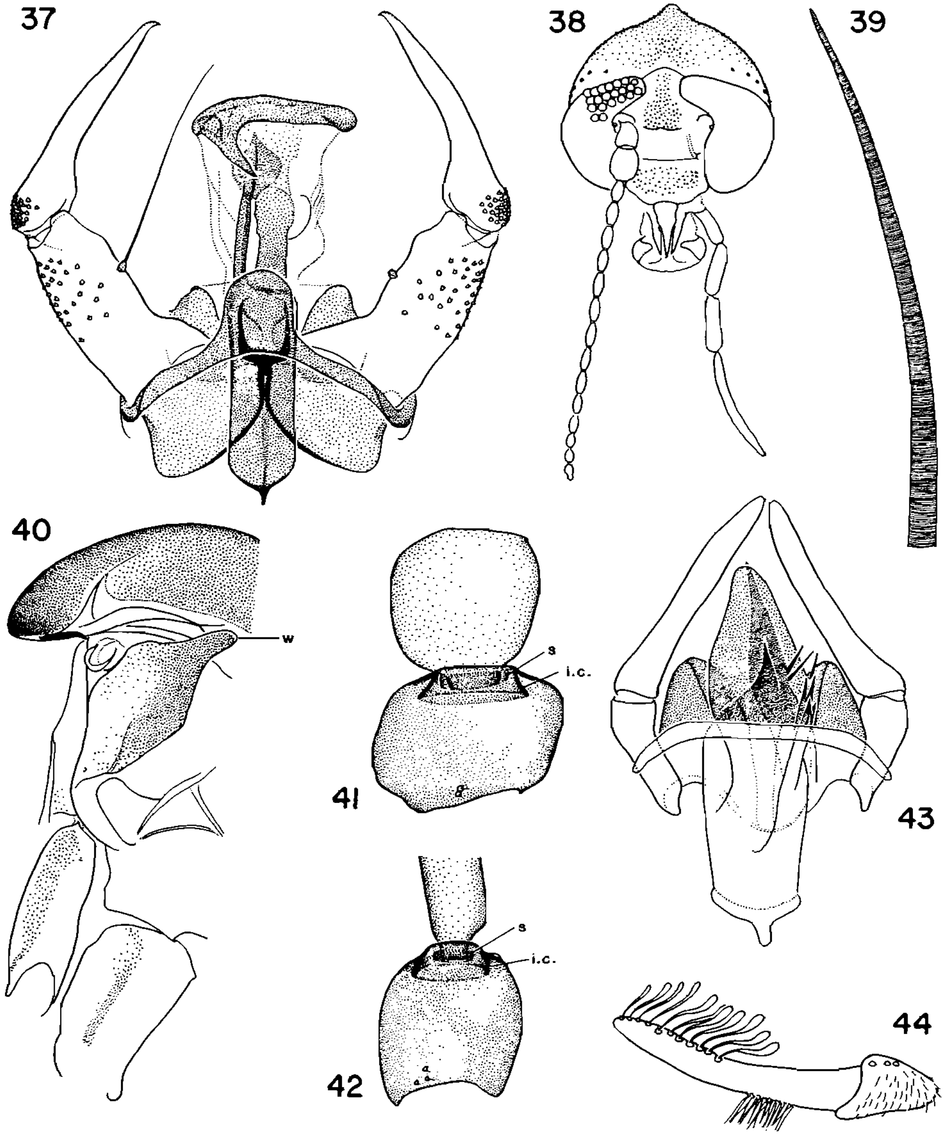
Genus *Setomima* Enderlein

Setomima Enderlein, 1937: 100.
Setomima, Duckhouse, 1966: 193.
Parabrunettia Vaillant, 1975: 165, as subgenus of *Brunettia* Annandale.

Type-species: *Setomima lithocolleta* Enderlein, 1937, by original designation.

This genus is recognised here as a member of the Tribe Maruinini, being linked with *Maruina* Müller, *Tonnoiriella, Arisemus* Satchell, *Neoarisemus* and many other southern genera by the structure of the male genital apodemes and other characters given in the tribal diagnosis. Within this tribe it is relatively primitive and thus cladistically basal (see discussion of genealogical relationships).

Setomima is a characteristic component of the psychodid fauna of the Afrotropics, and is strongly concentrated there. Since I last discussed it (Duckhouse 1978) more material has come to hand, including 3 new species, bringing the total to 10. Eight are only known reliably from males (see below), the remaining two from females only. Of these two, *grahami* may be the same as *pectinata* (Tonnoir, 1922: 31) and *lithocolleta* Enderlein is most probably the same as *gloriosa* (Tonn.).



Figs 37–44. (37–38) Male of *Tonnoiriella cracens* sp. n.: (37) forceps and aedeagus; (38) head. (39–40) Male of *Setomima splendens* Tonnoir: (39) tip of ascoid; (40) thorax, lateral (*w*, wing-like lobe of anepisternite). (41) Male of *Setomima spinifera* Duckhouse, pedicel and 1st flagellomere (*i.c.*, internal sclerotised collar; *s*, socket). (42) Male of *Aposycorax chilensis* (Tonnoir), pedicel and 1st flagellomere (abbreviations as for previous figure). (43–44) Male of *Setomima senegambica* Wagner, re-drawn from Wagner (1983). (43) forceps and aedeagus; (44) cercopod, dorsal.

Setomima is outstanding for its structural diversity, and the generic diagnosis of Duckhouse (1966) does not encompass the African species subsequently described by Duckhouse (1978), Wagner (1983) and in the present paper. The following, which includes a series of newly recognised features, may be treated as a revised diagnosis:

Head. Eyebridges well-developed, of 4 complete facet rows, or very short and separated by about one-third width of head; facets small. Postocular bristles small, lateral, not reaching level of eyebridges. Frontal scar patch without extension towards eyebridges and usually not divided by median scar-free band. First palpal segment with dorsolateral patch of sensory rods (eg. *gloriosa*, Fig. 66), sometimes closely grouped and sunken into pit (eg. *splendens* Tonnoir, Fig. 57); 2nd segment articulated on ventral side of 1st, subterminally. Antennal insertion area with sclerotised rim, often connected anteriorly with anterior tentorial pit; medial margin of eye sclerotised and often linked with anterior tentorial pit by line of sclerotisation.

Antenna. Flagellomere 1 about as large as flag. 2. Ascoids massive, sclerotised and with annular thickenings (Fig. 39), presumably to prevent buckling; flagellomere 2 usually with three ascoids, all others including last with two; one or occasionally more than one stout sensory seta at base of each ascoid; basal flagellomeres generally with longitudinal striations, sometimes sclerotised, along what may be lines of stress involved in supporting the ascoids; last flagellomere elongate pyriform and apiculus naked except for 2 stout terminal setae. Pedicel (Fig. 41) shorter than broad; socket (*s*) around articulatory process at base of flagellomere 1 as in all Psychodinae, and additional internal sclerotised collar (*i.c.*), flared at inner end, seen also in *Neoarisemus* species and *Aposycorax chilensis* (Tonn.) (Fig. 42).

Thorax (Fig. 40). Anepisternite with strong wing-like lobe (*w*) posterodorsally, overlapping rim of mesonotum.

Wing. Membrane densely covered by overlapping hairs or scales. Discrete rounded second costal node, above Sc. Macrotrichia generally absent except at bases and extreme tips of veins; where this is so, membrane and veins are covered uniformly with small scars left by the vestiture, and unless sclerotised the veins are indistinct.

Male genitalia. Ventral epandrial plate broadly fused with gonocoxal apodemes. Hypandrium often arched strongly backwards and attached to bases of coxites and to post-hypandrial plate. Retinacula usually all short and more or less club-shaped, or dimorphic, some elongate with expanded tips of types occurring also in *Alepia* and *Brunettia* species, the others usually in single line extending from tip of cercopod towards its base.

In *Setomima* the epandrium and associated structures differ conspicuously from those of other Psychodinae. In *gloriosa* (Tonnoir) a large U-shaped structure is attached to the distal end of the epandrium along a transverse hinge-line and is held in the vertical plane, at about 90° to the long axis of the epandrium. The cercopods are attached to this via a pair of small ridged sclerites. Possibly it is derived from the 10th tergite, and if so this may be a highly primitive arrangement, for the cerci (cercopods) arise embryologically as appendages of segment 11, which would presumably be at the distal end of the 10th segment.

According to McAlpine (1981), in Ptychopteridae, Blephariceridae, some Tipulidae, some Mycetophilidae and some Synneuridae, tergite 10 is divided medially and appears as two more or less lateral lobes articulated with the posterolateral margins of the epandrium—much as seen in *Setomima*. However, the appendages attached to the lateral lobes are regarded as 'surstyli'. In *Setomima* they are cercopods, considered here to be true cerci, comparable with the cerci of female Psychodidae, whose morphological position they echo precisely.

The very short eyebridges seen in *Setomima* species of subgenus *Setomima* may have been arrived at by reduction from a more primitive condition as seen in subgenus *Ophryosetomima* subg. n. Nonetheless, the stem form of this subfamily would have lacked eyebridges, as do all other subfamilies, and since *Setomima* seems to be one of the most plesiomorphic genera of Psychodinae it is possible that its short eyebridges actually represent a stage in the development, not the loss, of eyebridges. Certainly, in Mormiini it is mainly in the more plesiomorphic groups—*Gerobrunettia* and *Brunettia* subg. *Atrichobrunettia*—that short to very short eyebridges occur. In *Brunettia* s. str. nearly all species have well-developed eyebridges, commonly contiguous, and in *Mormia*, with very few exceptions they are contiguous.

Key to males of Afrotropical species of *Setomima*

(*S. lithocolleta* Enderlein and *S. grahami* (Tonnoir) are only known from females and are therefore omitted).

1 Eyebridges short and tapered (eg. Fig. 45), distance between equal to about 0,3 times width of head, or more (subgenus *Setomima*) 2

— Eyebridges long (eg. Fig. 70), separated by about 0,1 times width of head, or less (subgenus *Ophryosetomima* subg. n.) 5

2 Aedeagus with cluster of dark spines on one side, immediately behind hypandrium (Fig. 43) . . . . **senegambica** Wagner

— Aedeagus without spines in this position 3

3 Wing with M fork basal to level of CuA_2 (Fig. 67); hypandrium U-shaped, arched strongly backwards to far beyond level of tips of coxites (Fig. 68) . . . . . **gloriosa** (Tonnoir)

— M fork beyond level of CuA_2; hypandrium not U-shaped, not reaching level of tips of coxites 4

4 Wing broad (Fig. 58); aedeagal complex almost reaching level of tips of styles, distal element a parallel-sided spatulate process, broadly rounded at tip, and basal to it a series of powerful sclerotised points . . . . **splendens** (Tonnoir)

— Wing relatively narrow (Fig. 48); aedeagal complex only reaching half way to level of tips of styles, distal element a large tapered process, rounded at tip, basal to which are 3 blunt-tipped elements, the smallest with acorn-like tip . . . **pseudosplendens** sp. n.

5 Cercopod long and roughly C-shaped, with basal lobe and enlarged distal region bearing retinacula (eg. Fig. 86) 6

— Cercopod short and stout (eg. Fig. 77) 7

6 Forceps very long and slender; coxite as long as style (Fig. 92) .... **brachiata** sp. n.

— Forceps stout; coxite distinctly shorter than style (Fig. 83) .... **pectinata** (Tonnoir)

7 Aedeagal complex with numerous long fine spines; post-hypandrial plate appearing in dorsal view as a low dome .... **longispinosa** sp. n.

— Aedeagal complex with areas of very short spines; post-hypandrial plate appearing as conical sheath .... **spinifera** Duckhouse

Subgenus *Setomima*

Eyebridges short, tapered from base, separated by about one-third width of head. Sensory rods on palp basal in position, exposed or sunk in pit. Style slender, two or more times as long as coxite. Retinacula usually dimorphic—some more basal retinacula elongate, slender, flexible, enlarged distally and with hood-shaped tips; the others uniseriate, in line extending from tip of cercopod towards base.

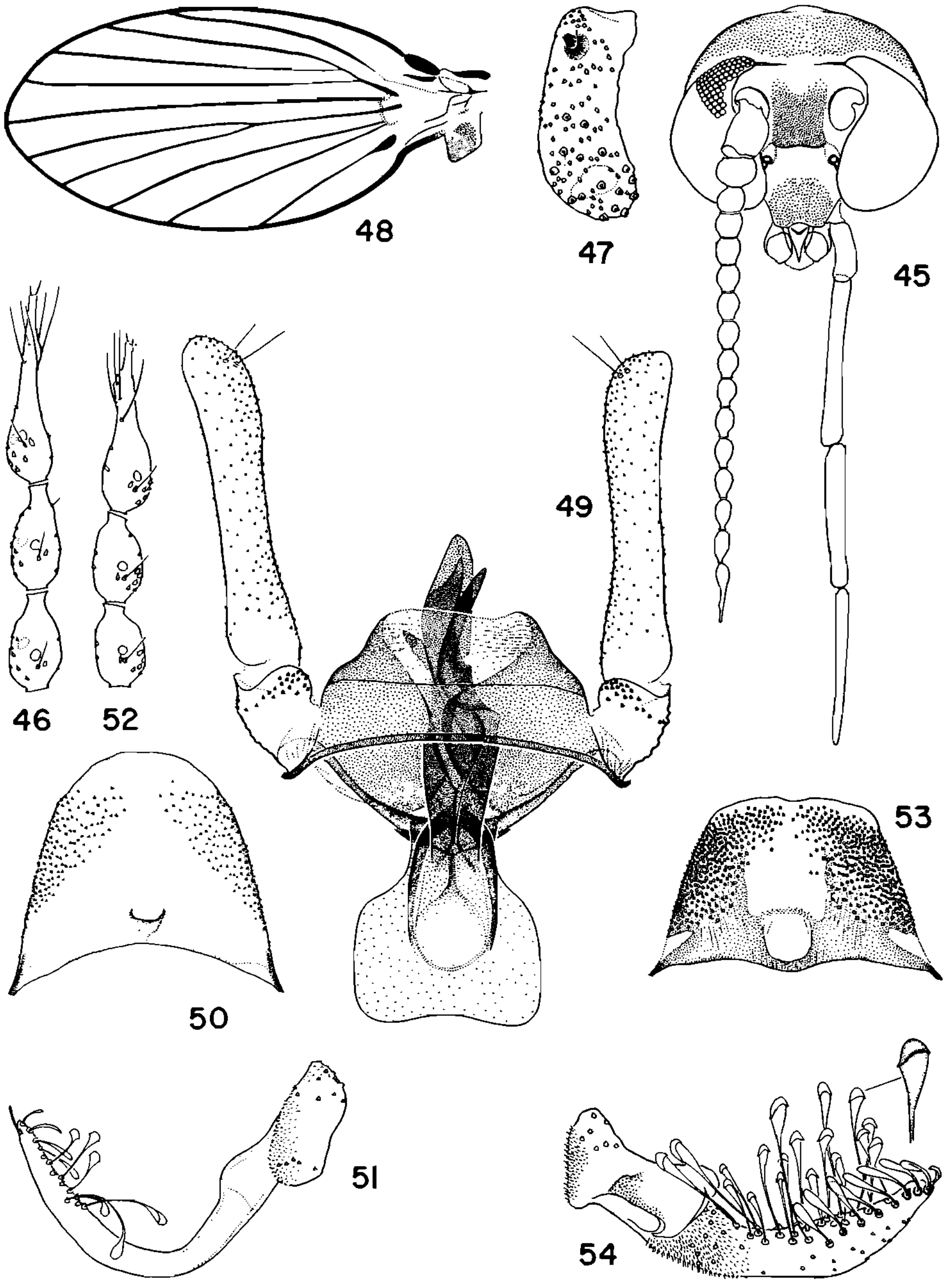
Setomima pseudosplendens sp. n.

Related to *splendens* (Tonnoir); readily distinguished by its relatively narrow wing and form of the male genitalia.

Male. Head (Fig. 45) 0,82 times as long as broad. Eyebridges separated by about 15 facet diameters (0,33 times width of head); interocular suture a pair of tapered spurs, directed medially. Frontal scar patch longer than in *splendens*, parallel-sided. Anterior tentorial pits with sclerotised rims, linked anteriorly to medial edge of eye by diagonal sclerotised bar; anterior tentorial tubes very inflated below pits. Cibarium with posterior arms long, curved, convergent. Clypeus narrow, extending far beyond level of eyes. Palpi (1,0–5,0–4,1–4,4) 2,5 times length of head; 2nd segment 1,2 times length of 3rd; 1st segment (Fig. 47) with sensory rods sunk into capacious pit, tips projecting through narrow aperture. Antenna only 0,95 times length of palp; 0,47 times length of wing. Basal flagellomeres almost spherical; neck absent from first, appearing and gradually lengthening on those that follow, reaching about 0,2 times length of basal bulb towards tip of antenna (Fig. 46). Distal flagellomeres with longer necks than *splendens*; last flagellomere elongate-pyriform, apiculus very long. Only 2 ascoids on flag. 2.

Wing, Fig. 48. Longitudinal veins devoid of macrotrichia except on Sc, R_{2+3+4} up to level of bifurcation between R_{2+3} and R_4, and on basal enlargements of M_{1+2} and CuA_2; a very few also present on pedicel at base of $M_3 + CuA_1$. R fork with stem about 0,5 times length of R_{2+3+4}; M fork only slightly beyond level of CuA_2. Winglength 2,5 mm.

Terminalia, Figs 49–51. Coxite slightly longer than broad and 0,3 times length of style; style very long, inflated distally, scars small, 2 setae distally. Aedeagal complex only reaching half way to level of tips of styles; distally, a large tapered process, rounded at tip, and 3 shorter processes, the smallest with acorn-like tip. Post-hypandrial plate forming pair of shoulders; linked to narrow hypandrium by very thin sheet of microsetose cuticle; curving ventrally to join gonocoxal



Figs 45–54. (45–51) Male of *Setomima pseudosplendens* sp. n.: (45) head; (46) tip of antenna; (47) 1st palpal segment; (48) wing; (49) forceps and aedeagus; (50) epandrium; (51) cercopod, lateral. (52–54) Male of *Setomima splendens* sp. n.: (52) tip of antenna; (53) epandrium; (54) cercopod, lateral.

apodemes. Aedeagal apodeme a broad angular plate. Epandrium, Fig. 50; pseudospiracular openings fused. Cercopods slender, bearing longitudinal row of about 5 clavate retinacula and few longer retinacula with clavate to hooded tips.

Material examined: Holotype ♂, ZAÏRE, S of Walikale, 700 m, 25.xii.1957 (E. S. Ross & R. E. Leech).

Setomima splendens (Tonnoir)

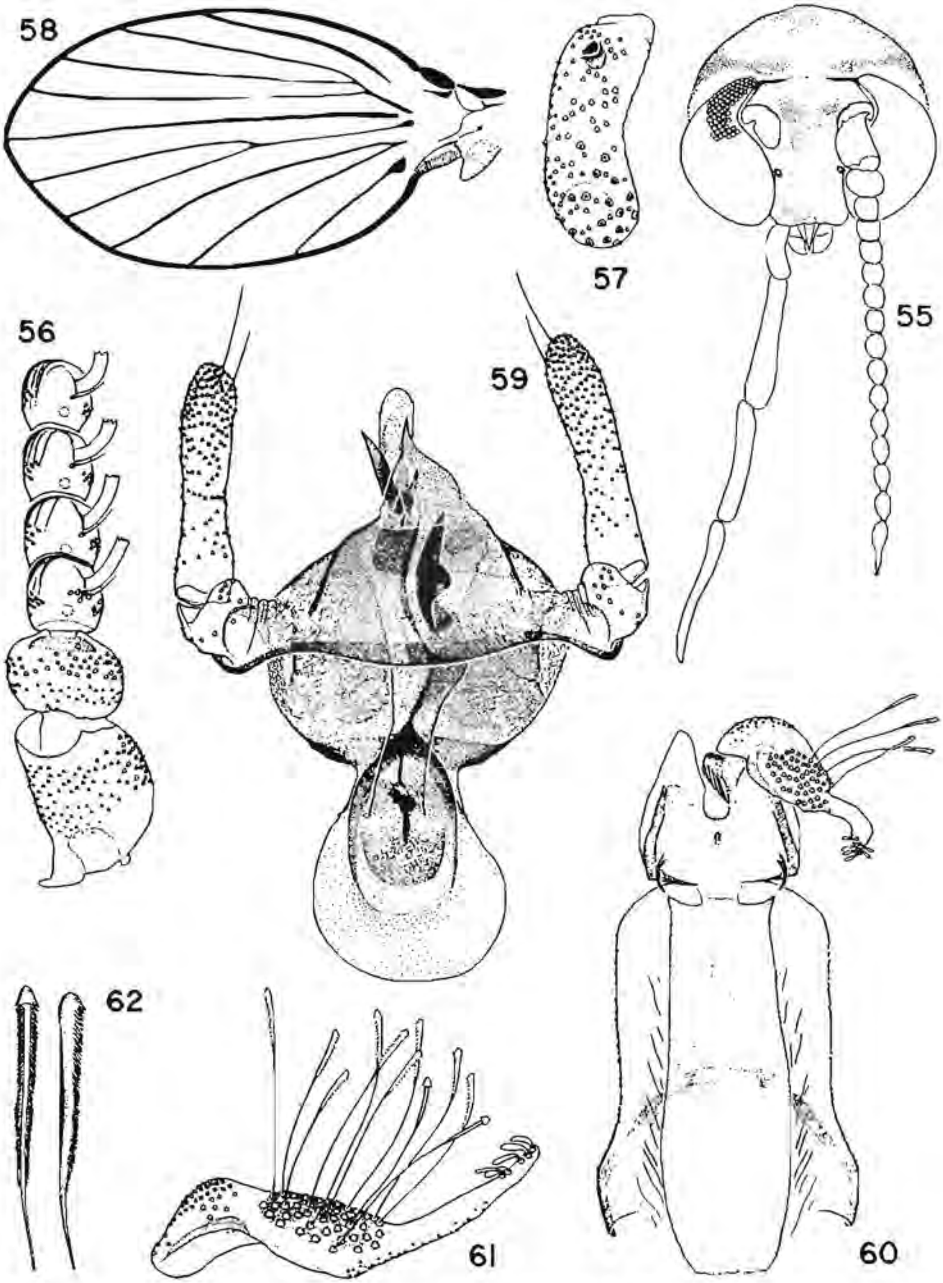
Brunettia splendens Tonnoir, 1920: 140; Tonnoir, 1939: 70.
Parabrunettia splendens; Enderlein, 1937: 106.
Setomima splendens; Duckhouse, 1966: 193.
Brunettia (Parabrunettia) splendens; Vaillant, 1975: 160.

The following redescription is based on new material dissected by myself, supported by a re-examination of Tonnoir's Ruwenzori specimens.

Male. Head (Fig. 55) exceptionally narrow for *Setomima*, about 0,85 times as long as broad. Eyebridges separated by 26 facet diameters (0,37 times width of head); interocular suture a pair of stout tapered spurs, directed medially, connected by band of sclerotisation. Frontal scar patch narrow anteriorly, broadening posteriorly. Anterior tentorial pits with sclerotised rim, linked to medial edge of eye by line of sclerotisation; anterior tentorial tube inflated below pit and fluted longitudinally. Cibarium with posterior arms long, curved, divergent. Clypeus narrow, short, not extending beyond level of eyes. Palpi (1,0–2,4–2,1–2,5) only 2,07 times length of head; 2nd segment 1,14 times length of 3rd; 1st segment (Fig. 57) with sensory rods sunk in pit, tips projecting through broad aperture. Antenna (Figs 52, 56) about as long as palp; only 0,41 times length of wing. Basal flagellomeres without necks, articulations very broad, lines of sclerotisation dorsally; distal flagellomeres with very short necks, about 0,14 times lengths of basal bulbs, necks and apiculus proportionately shorter than in *pseudosplendens*. Only 2 ascoids on flag. 2.

Thorax (Fig. 40). Wing (Fig. 58) exceptionally broad, especially in distal half, around level of $R_2 - R_3$ and M_3. Longitudinal veins devoid of macrotrichia except for Sc, R_{2+3+4} to just short of bifurcation between R_{2+3} and R_4, and broadened bases of M_{1+2} and CuA_2; veins faint except where sclerotised; R fork abnormally basal in position—its stem very short, only about 0,29 times length of R_{2+3+4}; M fork halfway between levels of tips of CuA_1 and CuA_2. Winglength 2,75 mm.

Terminalia (Figs 53–54, 59). Coxite about as long as broad and 0,32 times length of style; style with 2–3 setae distally. Aedeagal complex almost reaching level of tips of styles; distal element a parallel-sided spatulate process, broadly rounded at tip; basal to this a series of powerful sclerotised points, one with large lateral step. Post-hypandrial plate linked to hypandrium by very thin sheet of microsetose cuticle; curved ventrally to join gonocoxal apodemes. Aedeagal apodeme a broad rounded plate, not shown in Tonnoir's (1939) diagram but faintly visible in corresponding preparation. Epandrium (Fig. 53) truncated; triangular unsclerotised zone on either side at base; pseudospiracular openings fused. Cercopods with longitudinal row of 7–9 clavate retinacula and large group of long hooded, longitudinally striated retinacula; articulated with epandrium at level of rounded lobe on dorsal side, placed about one-third distance from base to apex; apical



Figs 55–62. (55–59) Male of *Setomima splendens* sp. n.: (55) head; (56) base of antenna; (57) 1st palpal segment; (58) wing; (59) forceps and aedeagus. (60–62) Male of *Setomima gloriosa* (Tonnoir): (60) epandrium and cercopods; (61) cercopod, lateral; (62) enlarged view of tips of retinacula.

region (bearing retinacula) directed anteriorly; U-shaped lobe between cercopods at point of articulation.

Material examined: 1♂, UGANDA, Ruwenzori Range, Namwamba Valley, Kilembe, 1370 m, xii.1934–i.1935 (F. W. Edwards) (as described by Tonnoir, 1939); 1♂, ZAÏRE, Stanleyville, v–vii.1928 (R. Schwetz).

A female from Zaïre described by Tonnoir (1939) as the allotype was not collected with the holotype and I see no reason to treat it as the same species.

Setomima gloriosa (Tonnoir)

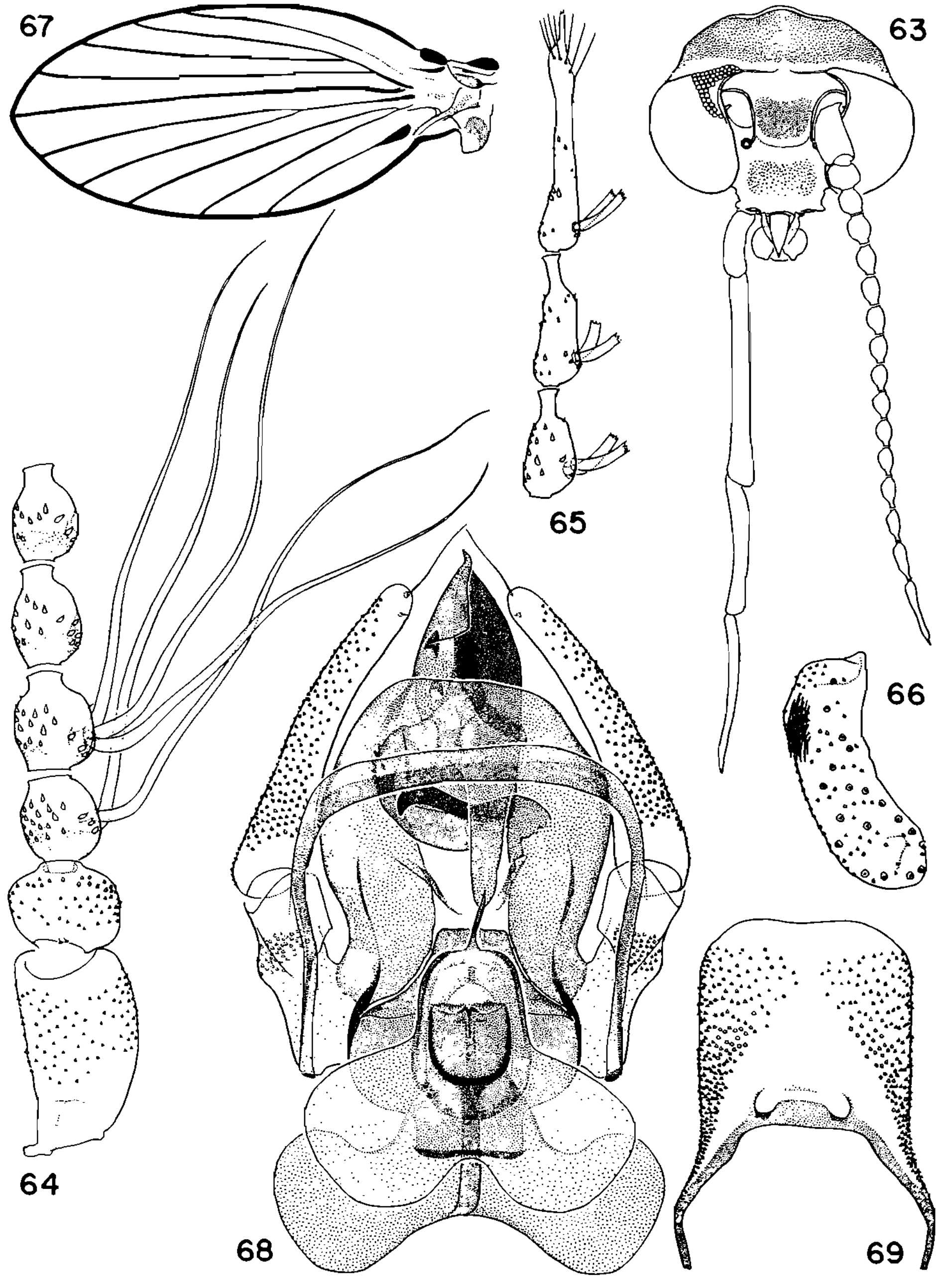
Brunettia gloriosa Tonnoir, 1939: 73.
Setomima gloriosa; Duckhouse, 1966: 193.
Brunettia (Parabrunettia) gloriosa; Vaillant, 1975: 160.

Male. Head (Fig. 63) about 0,78 times as long as broad, margins behind eyes undulate, occipital region with narrow scarless flange. Eyebridges separated by 16 facet diameters (0,32 times width of head); interocular suture a pair of slender curved spurs, directed medially, narrowly separated in midline. Frontal scar patch broader than long. Anterior tentorial pits with sclerotised rim, well separated from eye and not connected to it by sclerotisation; anterior tentorial tube inflated below pit. Clypeus broad, extending far beyond level of eyes. Palpi (1,0–3,2–2,1–2,3) very long: 2,7 times length of head; 2nd segment 1,5 times length of 3rd; 1st segment (Fig. 66) with large patch of sensory rods on surface. Antenna (Figs. 64–65) 0,97 times length of palp and 0,47 times length of wing. Flagellomere 1 broadly articulated with 2, expanded distal rim but no true neck; other flagellomeres with necks successively longer and narrower, up to flag. 11, whose neck is 0,4 times length of basal bulb; flag. 14 very elongate, its apiculus exceptionally slender. Flag. 2 with 3 ascoids.

Wing (Fig. 67) relatively narrow and pointed. Longitudinal veins faint, without macrotrichia except for Sc, R_{2+3+4} and broadened bases of M_{1+2} and CuA_2. Stem of R fork longer than in *splendens*, about 0,46 times length of R_{2+3+4}. M fork well basal to level of tip of CuA_2. Winglength 3,4 mm.

Terminalia (Figs 60–62, 68–69). Coxite elongate, about 2 times as long as broad and 0,6 times length of style, inflated laterally, halfway from base to tip; style slightly tapered, one large and one small seta distally.

Aedeagal complex with 2 sclerotised distal elements reaching just beyond tips of styles; one element narrow and twisted apically, the other with large semicircular base, spinous laterally. Hypandrium arched strongly backwards and thus U-shaped; arms of U closely attached, possibly fused, to rims of coxites. Posthypandrial plate contiguous with apical region of hypandrium; curving ventrally on either side to join posterior gonocoxal apodemes, which arise from coxites. Aedeagal apodeme with median ventral concavity as in all Maruinini, and very large lateral wings, divided by deep anterior emargination. Anterior gonocoxal apodemes with massive lateral wings beneath wings of aedeagal apodeme and with median thickening, contiguous posteriorly with a hemispherical element, fitting into ventral concavity of aedeagal apodeme to form 'ball-and-socket' articulation. Epandrium long, parallel-sided; pseudospiracular apertures wide apart but linked. Ventral epandrial plate broadly contiguous anteriorly with anterior gonocoxal



Figs 63–69. Male of *Setomima gloriosa* (Tonnoir): (63) head; (64) base and (65) tip of antenna; (66) 1st palpal segment; (67) wing; (68) forceps and aedeagus; (69) epandrium, ventral.

apodemes; contiguous posteriorly with large bilobed structure (homologous with U-shaped lobe in *splendens*) to which cercopods are attached. Cercopods with apical row of 5–7 very short clavate retinacula and group of long, slender, flexible retinacula with expanded tips (Fig. 62) inserted in large sockets on area of darkly sclerotised cuticle.

Material examined: Holotype ♂, UGANDA, Ruwenzori Range, Kilembe, 1370 m, xii.1934–i.1935 (F. W. Edwards). Other specimens: 1♂, ZAÏRE, 39 km S of Walikale, 700 m, 25.xii.1957 (E. S. Ross & R. E. Leech); 1♀, Uganda, 16 miles NW of Bushenyi, 1450 m, 6.xii.1957 (Ross & Leech).

Tonnoir dissected the genitalia of the holotype from the abdomen by a transverse cut that left the bases of the coxites and most of the gonocoxal and aedeagal apodemes behind. This is the reason for the major differences between my Fig. 68 and Tonnoir's Fig. 124. However, my specimens had been preserved in alcohol for several years before I received them and thus lost much of their sclerotisation. I saw the tips of the long flexible retinacula as in Fig. 62, but in Tonnoir's darker specimen the serrations seem coarser and in frontal view angular, like two rows of truncated leaflets. Probably that is a more accurate description of their structure.

Edwards collected two females of *Setomima* with *gloriosa* on Kilembe, described by Tonnoir as the same species. However, although 'the wing venation is exactly as in the male' (Tonnoir p. 74) there seems to be nothing else to link them, and as at least one other species of *Setomima* occurs on Kilembe the association is dubious.

Setomima senegambica Wagner

Setomima senegambica Wagner, 1983: 98.

Wagner's (1983) description is based on a single male collected in Abuko Nature Reserve, Gambia. It is a member of subg. *Setomima*, as shown by the form of the eyebridges, styles slender and twice as long as coxite, and arrangement of retinacula. *S. senegambica* is distinguished from other species by the shape of the aedeagus (Fig. 43), especially the very broad dorsal sclerite, tapered to rounded apex, the group of dark spines on one side, just behind hypandrium, the form of the cercopod (Fig. 44), and apparently by the form of the retinacula, which Wagner shows as undulate clavate.

Subgenus **Ophryosetomima** subg. n.

Derivation: *Ophrys* (Gr.) = brow, eyebrow + *Setomima*.
Gender: Feminine.
Type-species: *Setomima spinifera* Duckhouse, 1978, by present designation.

Head short and broad and eyebridges long, separated by about one tenth width of head, or less. Sensory rods on palp never especially basal in position or sunk in pit as in *splendens* group. Style beaked, usually stout, often less than twice as long as coxite, bearing 1–2 long stout sensory setae. Retinacula all short, clavate, prostrate, scattered on expanded distal end of cercopod.

Setomima spinifera Duckhouse

Setomima spinifera Duckhouse, 1978: 342.

The original description is emended and augmented as follows:

Male. Flagellomere 2 with 3 ascoids. Wing with longitudinal veins sclerotised and prominent; macrotrichia extending further along veins than in most *Setomima* species: from base of R_{2+3+4} to R_2, R_3 and R_4 at level of M fork; on M_{1+2} to level of fork, and on CuA_2 to beyond midway from base to tip; some also present at tips of veins $R_1 - CuA_2$. Stem of R fork 0,37 times length of R_{2+3+4}. M fork slightly basal to level of CuA_2.

Terminalia similar to *longispinosa*: differing mainly in form of apodemes. Small waisted sclerite with median foramen behind ventral epandrial plate as in *longispinosa*, but less sclerotised and foramen smaller; striated leaf-shaped elements present, but shape not clear in specimen.

Material examined: Holotype ♂, SOUTH AFRICA, Transvaal, Soutpansberg Range, Entabeni Forestry Station, Vera Kop Forest, 15.i.1974 (B. R. Stuckenberg).

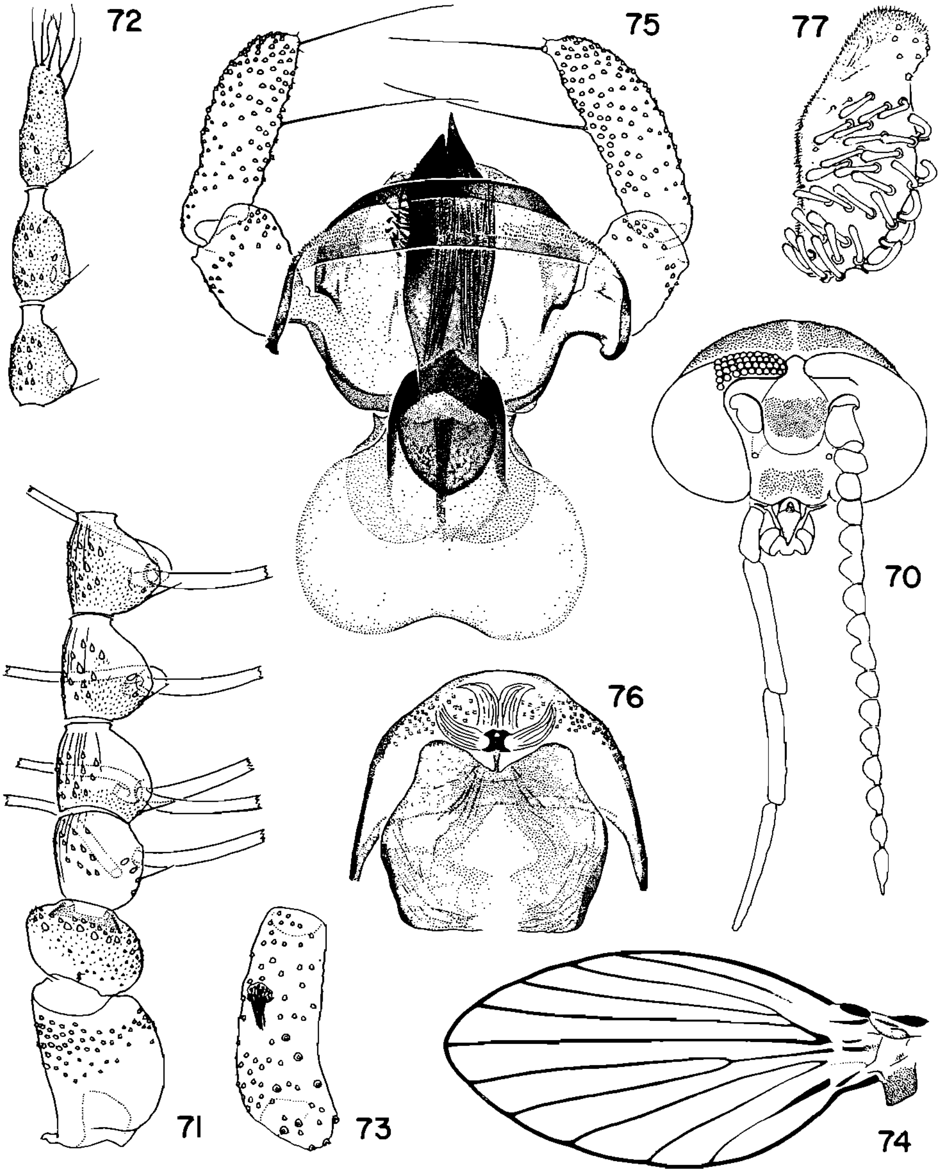
Setomima longispinosa sp. n.

Related to *spinifera* Duckhouse; distinguished by its numerous long fine aedeagal spines and low dome-shaped outline of post-hypandrial plate.

Male. Head (Fig. 70) 0,67 times as long as broad; vertex low and rounded, scars divided medially by broad scar-free band. Eyebridges as in *spinifera*, separated by 2,5 facet diameters (0,06 times width of head); interocular suture a high arch. Frontal scar patch on rounded lobe, broadened posteriorly, notched anteriorly but not divided. Anterior tentorial pits not connected with rims of eyes; anterior tentorial tubes inflated immediately beneath pits. Clypeus broad, scarcely extending beyond level of eyes. Palpi (1,0–2,5–2,1–2,4) 2,34 times length of head; 2nd segment 1,19 times length of 3rd; 1st segment (Fig. 73) with small group of sensory rods, tips converging to form brush. Antenna (Figs 71–72) essentially as in *spinifera*; flagellomere 1 without neck or rim, very broad articulation with 2; other flagellomeres with necks successively longer and narrower, up to flags. 12–13, whose necks are 0,22 times length of basal bulbs; basal bulbs very eccentric, enlarged where ascoids are inserted; apiculus normal. Flag. 2 with 3 ascoids.

Wing (Fig. 74). Margin scalloped between tips of veins. Longitudinal veins sclerotised; as in *spinifera*, macrotrichia extending further along veins than in most *Setomima* species: on R_2 and R_3 to beyond level of M fork; on R_4 to level of M fork; on M_{1+2} to two-thirds distance from base to tip, and on CuA_2 to beyond midway from base to tip; some also present at tips of veins $R_1 - CuA_2$. Stem of R fork about 0,36 times length of R_{2+3+4}; M fork slightly basal to level of tip of CuA_2; jugum quadrangular. Winglength 2,95 mm.

Terminalia (Figs 75–77). Forceps stout; coxite longer than broad, about 0,6 times length of style. Apex of style beaked, with one large and 2 very small sensory setae; second large seta on inner side midway from base to tip. Aedeagal complex with 2 sclerotised distal elements, one longer and slenderer than the other; numerous fine aedeagal spines, almost as long as style, and lateral group of short spines, homologous with those of *spinifera*. Hypandrium arched backwards to level half way between base and apex of coxites, less sharply angled than in *spinifera*. Post-hypandrial plate not appearing conical as in *spinifera* but forming curved strap-like sclerotisation above aedeagus, linked to hypandrium by very thin sheet of



Figs 70–77. Male of *Setomima longispinosa* sp. n.: (70) head; (71) base and (72) tip of antenna; (73) 1st palpal segment; (74) wing; (75) forceps and aedeagus; (76) epandrium; (77) cercopod.

microsetose cuticle. Aedeagal apodeme with large rounded wings, divided by shallow rounded anterior emargination; anterior gonocoxal apodemes with small rounded wings. Epandrium short, posterior shoulders rounded. Ventral epandrial plate short, left and right halves broadly united posteriorly; small waisted sclerite with median foramen posteriorly connected to 2 pairs of striated leaf-shaped elements and linked with ventral epandrial plate by narrow stalk. Cercopods as in *spinifera*.

Material examined: Holotype ♂, SOUTH AFRICA, Natal, Eshowe District, Dlinza Forest, 450 m, swept from herbage, 20.xi.1978 (B. R. Stuckenberg).

Setomima pectinata (Tonnoir)

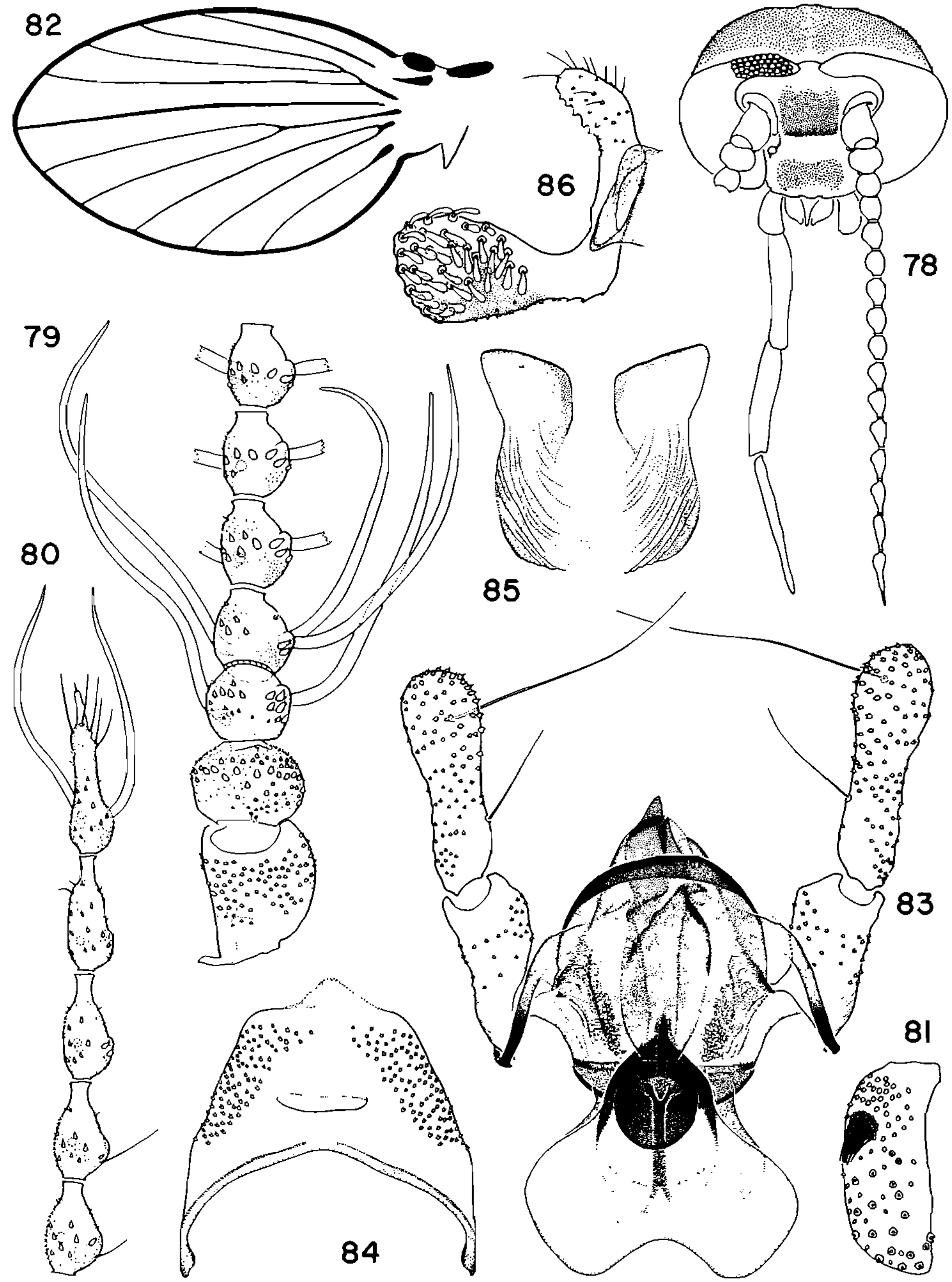
Brunettia pectinata Tonnoir, 1922: 106–111.
Parabrunettia pectinata; Enderlein, 1937: 106.
Setomima pectinata; Duckhouse, 1966: 193.
Brunettia (Parabrunettia) pectinata; Vaillant, 1975: 160.

Tonnoir's description of *pectinata* was based on a single undissected male and only gave details of the vestiture together with a few broader, largely generic, features of antennae, eyes, palpi and wing venation. It is of no assistance for purposes of comparison or identification. Tonnoir (1922) says *pectinata* could be the male of *grahami*, known only from the female. I have now re-examined and dissected the holotype and one additional specimen, both collected by Dr J. W. Scott Macfie in Ghana. Tonnoir's description of the eyes as 'reniformes remontant sur le front où ils sont très étroitement séparés' is incorrect. The following redescription is based on both specimens.

Male. Head (Fig. 78) 0,73 times as long as broad; vertex rounded, almost twice as high as *spinifera* or *longispinosa*, scars divided medially by irregular scar-free band. Eyebridges similar to *spinifera* but sharply tapered at inner ends and fifth row of facets sometimes incomplete; separated by 3,0 facet diameters (0,07 times width of head); interocular suture arched. Frontal scar patch almost square in outline, no sign of division. Anterior tentorial pits connected with medial edge of eye by line of sclerotisation. Clypeus broad, extending slightly beyond level of eyes. Palpi (1,0–2,5–2,3–2,8) 2,1 times length of head; 2nd segment 1,07 times length of 3rd; 1st segment (Fig. 81) with large group of sensory rods, tips converging to form brush. Antenna (Figs. 79–80) more lightly constructed than in *spinifera* and *longispinosa*; flagellomere 1 almost spherical, without neck or rim; necks of other flagellomeres reaching 0,27 times length of basal bulbs (flag. 11); ascoids shorter and basal bulbs less eccentric than in *spinifera* and *longispinosa*; apiculus slender. Flag. 2 with 3 ascoids.

Wing (Fig. 82). Margin scalloped between tips of veins. Longitudinal veins faint, macrotrichia scarcely differentiated except on Sc, R_{2+3+4} (but not R_{2+3}) and on broadened bases of M_{1+2} and CuA_2. Stem of R fork about 0,49 times length of R_{2+3+4}; M fork slightly basal to CuA_2. Jugum triangular. Winglength 2,3 mm.

Terminalia (Figs 83–86). Forceps stout; coxite about 2 times as long as broad, concave between distal articulatory processes, not rounded as in *spinosa* and *longispinosa*. Apex of style strongly beaked on ventral side, beak thus not visible in dorsal view; apex with one large and 2–3 very small sensory setae; second large seta



Figs 78–86. Male of *Setomima pectinata* (Tonnoir): (78) head; (79) base and (80) tip of antenna; (81) 1st palpal segment; (82) wing; (83) forceps and aedeagus; (84) epandrium, ventral; (85) ventral epandrial plate; (86) cercopod, lateral.

on inner side in basal half. Aedeagal complex with 2 very unequal distal elements, the longer stouter than the shorter; no aedeagal spines. Hypandrium arched, sclerotised adjacent to coxites but tenuous between. Post-hypandrial plate strongly sclerotised, arched, linked to hypandrium by thin sheet of cuticle. Aedeagal apodeme with large, angular wings, divided by deep rounded anterior emargination; anterior gonocoxal apodemes with wings resembling those of aedeagal apodeme but deeply divided by V-shaped emargination. Epandrium longer than in *spinosa* and *longispinosa*, shoulders well marked. Ventral epandrial plate similar to *longispinosa* but left and right halves completely separate posteriorly; not contiguous with gonocoxal apodemes. Cercopods enlarged apically and bearing retinacula as in *spinosa* and *longispinosa*; base produced to form separate setose lobe. Before dissection, cercopod orientated rather as in *gloriosa*, its apical lobe almost horizontal, occupying space between forceps and epandrium, its basal lobe vertical.

Material examined: Holotype ♂, GHANA, Msawam, i.1920 (J. W. Scott Macfie); ♂, Ghana, Accra, in laboratory, iv.1922 (Scott Macfie).

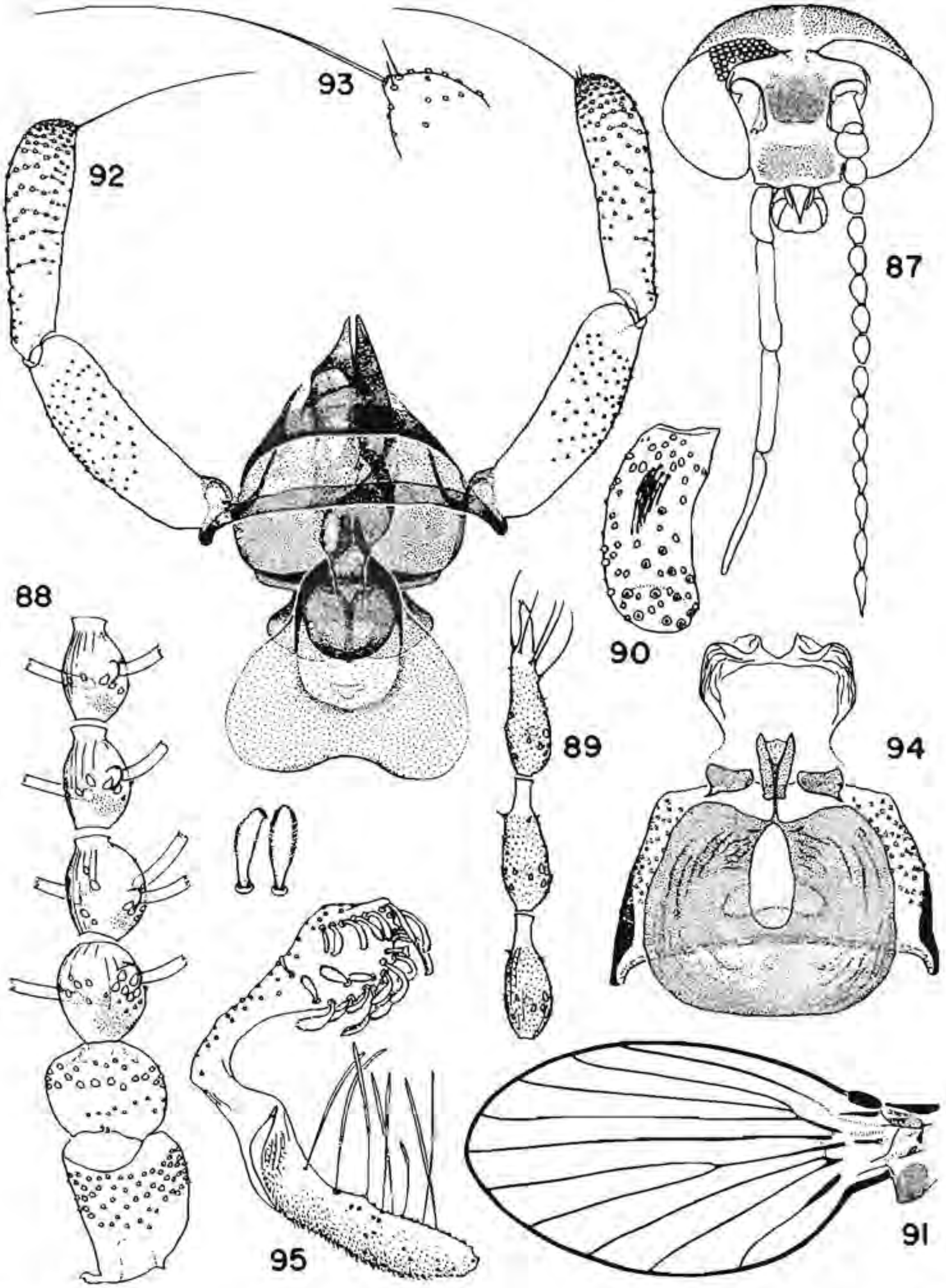
Setomima brachiata sp. n.

Characterised by its elongate coxites and by structure of epandrium and cercopods.

Male. Head (Fig. 87) about 0,67 times as long as broad; as in *spinifera*, vertex low and rounded, its scars divided medially by broad scar-free band. Eyebridges somewhat reduced, sharply tapered at inner ends; separated by 5,7 facet diameters (0,09 times width of head); interocular suture a pair of short spurs, directed medially, separated by about 2,2 facet diameters. Frontal scar patch notched anteriorly but not divided. Anterior tentorial pit linked to medial margin of eye by line of sclerotisation. Clypeus broad, extending slightly beyond level of eyes. Palpi (1,0–2,0–1,8–2,25) 2,1 times length of head; 2nd segment 1,07 times length of 3rd; 1st segment (Fig. 90) with group of sensory rods, tips not converging noticeably. Antenna (Figs 88–89), similar to *pectinata*. Flagellomere 1 more elongate than *pectinata*, without neck or rim, articulation with 2 not particularly broad; other flagellomeres with necks successively longer and narrower, up to flag. 12, whose neck is 0,28 times length of basal bulb; apiculus normal. Flag. 2 with 3 ascoids.

Wing (Fig. 91). Longitudinal veins with scars distinctly larger than those on membrane and hence less faint than in most *Setomima* species. Stem of R fork only about 0,13 times length of R_{2+3+4}; M fork between levels of tips of CuA_1 and CuA_2. Winglength 2,1 mm.

Terminalia (Figs 92–95). Forceps very long and slender; coxite as long as style and about 3,4 times as long as broad; apex of style beaked, bearing 1 large and ventrally 2 small sensory setae. Scars on styles linked by fine transverse lines on intervening cuticle. Aedeagal complex: apex beak-like, formed from 2 elements reaching level of tips of coxites; some 'warty' areas internally, possibly patches of reduced spines. Hypandrium a broad, low arch. Post-hypandrial plate strongly sclerotised, arched, widely separated from hypandrium, curving ventrally to join longitudinally corrugated posterior gonocoxal apodemes. Aedeagal apodeme with



Figs 87–95. Male of *Setomima brachiata* sp. n.: (87) head; (88) base and (89) tip of antenna; (90) 1st palpal segment; (91) wing; (92) forceps and aedeagus; (93) enlarged view of tip of style, ventral; (94) epandrium; (95) cercopod, lateral (inset showing enlarged view of retinacula).

large rounded wings, divided by shallow rounded anterior emargination; anterior gonocoxal apodemes with wings angular, as in Fig. 92 (holotype) or broader. Epandrium with broad pointed shoulders; ventral epandrial plate contiguous with gonocoxal apodemes, elongate foramen present; posteriorly, a Y-shaped element, connected to ventral epandrial plate by narrow stalk, flanked by pair of angular plates; further posteriorly, a tenuous lobed structure to which cercopods are articulated. Cercopods elongate, C-shaped, similar to *pectinata* but retinacula fringed and basal lobe longer, so articulated that the concavity faces backwards, the upper arm, bearing retinacula, flanks the aedeagus, while the lower arm is placed in usual position for a cercopod in other genera.

Material examined: Holotype ♂, KENYA, Rift Valley, Kampi-Ya-Samaki, Lake Baringo, 00°37'N:36°02'E, 980 m, 30.v.-2.vi.1980 (B. Lamoral). Paratype: 1♂, SOUTH AFRICA, Natal, Ndumu Game Reserve, 2632 Cd, Rest Camp, 23-9.xi.1977 (D. J. Brothers & C. Jacot-Guilarmod).

Genealogical relationships of *Setomima*

Setomima is part of a taxonomic but not necessarily genealogical subgroup of Maruinini showing some or all of the following: (i) several to many retinacula; (ii) hair on ventral side of epandrium; (iii) a distinct discontinuity (articulation) between epandrium and hypandrium; (iv) a direct connection between anterior end of ventral epandrial plate and gonocoxal apodemes; (v) vestiture on the wing membrane; (vi) pedicel with internal sclerotised collar. All appear to be plesiomorphisms of this tribe. The subgroup includes *Setomima, Alepia* Enderlein, *Neoarisemus* and *Paratelmatoscopus* Satchell. Notwithstanding the probable plesiomorphic nature of the above features I suspect that these genera are relatively closely related, but it would be premature to segregate them.

Setomima appears to be closest to the plant-container and tree-hole breeding *Alepia*, a Neotropical genus. Duckhouse (1978) suggested that these are possibly sister groups. The larva of the Nearctic *S. nitida* (Banks) was first described by Quate (1955) and Vaillant (1975) gave further structural details. Recently I obtained immatures of several *Alepia* species and they appear to be very similar to *nitida*. Some of the common characters could be plesiomorphisms, or apomorphisms developed convergently as adaptations to life in tree-holes and plant-containers. However, the adults also are linked by *Alepia* species that approach *Setomima* in male genital structure. Especially striking is the similarity between cercopods of various *Alepia* species including *A. eburna* (Rapp) (figured by Duckhouse 1974) and those of *Setomima gloriosa*. Here, the enlarged basal region bears long slender and flexible retinacula with expanded tips as shown in Fig. 62, inserted in large sockets on an area of darkly sclerotised cuticle, while the distal region is tapered to a slender process carrying one or more short retinacula, more nearly normal in form.

Duckhouse (1978) noted that *Setomima* is also linked with the New Guinean *Gerobrunettia* Quate & Quate by several apomorphisms: Head generally with very short eyebridges; ascoids exceedingly long, giving antenna a pectinate appearance; palp with 2nd segment exceptionally long, 1,5–2,0 times length of 3rd; presence of 'bell-tipped' retinacula.[1] I added that these genera also share a very similar wing venation and have hair or scales on the wing membrane. Thus, the similarity is striking and my first reaction was to view *Gerobrunettia* as part of *Setomima*. However, the genital apodemes of *Setomima* are precisely those of the Tribe Maruinini, while *Gerobrunettia* has genitalia and some other features that agree instead with *Brunettia*. This being a large difference, I therefore suggested that the above-mentioned characters of the head and its appendages might be correlated and could have been independently derived in two quite separate lines, culminating in *Gerobrunettia* on the one hand and *Setomima* on the other.

Having now re-examined type material of *Gerobrunettia geminata* Quate & Quate, I conclude that the agreement in structure is closer than I thought and that there is a relatively close genealogical relationship between *Setomima* and *Gerobrunettia* and also between *Gerobrunettia* and *Brunettia*: *Gerobrunettia* is annectant between *Setomima* and *Brunettia* (Fig. 96); *Gerobrunettia, Brunettia* and *Mormia* (Tribe Mormiini) form the apomorph sister group of *Setomima* and its immediate relatives in the Tribe Maruinini.

Some species of *Atrichobrunettia*, the most plesiomorphic subgenus of *Brunettia*, are close to *Gerobrunettia*. The New Guinean *Brunettia* (*A.*) *bisulca* (Quate & Quate) agrees with *G. geminata* in having widely separated eyebridges, attenuated medially, sickle-shaped styles with cleft tips; cercopods little longer than wide, bearing angulated and long curved retinacula; and closely similar female genitalia.

The branching point that gave rise to the lines leading to the maruinine *Setomima* and the mormiine *Gerobrunettia* must have occurred at a remote point in time, so that as originally supposed (Duckhouse 1978), the distinction between the types of genitalia seen in these genera is deeply rooted in the evolutionary history of the Psychodinae.

As will be shown later, the Mormiini appear to be one of a series of lines that have evolved from maruinine ancestors, and in each line the transition has involved transformation or loss of the maruinine 'ball-and-socket' linkage between gonocoxal apodemes and aedeagal apodeme. In Paramormiini a transformed linkage is still seen in some genera (eg. furca of *Elsahowia, Telmatoscopus* subg. *Jungiella* Vaillant, *Paramormia* Enderlein).

These relationships, shown in Fig. 96, are supported by the following apomorphisms (which except where otherwise stated refer to the male), identified using outgroup comparisons and cross-checked where possible by assessment of other

---

[1] Satchell (1955) and Quate (1959) imply, though they do not clearly state, that the retinacula of *Setomima* (then part of *Brunettia*) are bell-tipped as in *Trichopsychoda*. As shown by diagrams in Tonnoir (1939) and in the present paper, they are not bell-tipped. The ones Satchell and Quate were apparently referring to are clavate, with the expanded distal region hooded (Figs 54, 62), and in *gloriosa* serrated on either side. In *Trichopsychoda* species some of the retinacula (generally 3–4) are borne in a similar preapical position to the clavate retinacula of *Setomima* and like them have long flexible shafts; but the apex is truly bell-shaped, or like an expanding toadstool or umbrella (eg. Satchell 1953 Fig. 18H, Satchell 1955 Fig. 1E, Quate 1965 Fig. 20c) and thus is not very similar. Nonetheless, there is evidence for a sister group relationship between *Setomima* and *Alepia*, and some *Alepia* have long flexible preapical retinacula as in *Setomima* but with 'bell' tips as in *Trichopsychoda*. Thus, in spite of their different appearance, bell-tipped and clavate retinacula of these types may share a common origin. Possibly the bell tip is homologous with the apical hood of *Setomima*.

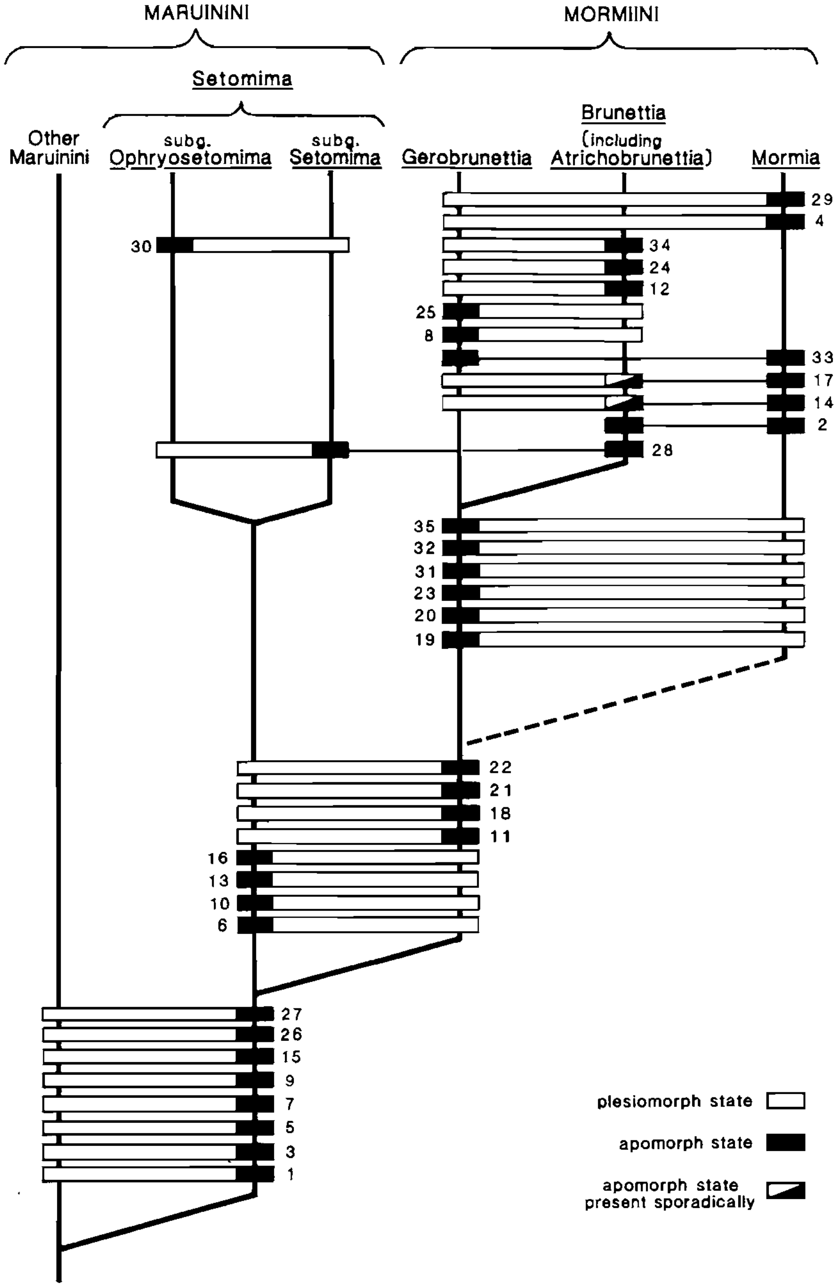

MARUININI
MORMIINI
Setomima
Other Maruinini
subg. Ophryosetomima
subg. Setomima
Gerobrunettia
Brunettia (including Atrichobrunettia)
Mormia
29
4
30
34
24
12
25
8
33
17
14
2
28
35
32
31
23
20
19
22
21
18
11
16
13
10
6
27
26
15
9
7
5
3
1
plesiomorph state
apomorph state
apomorph state present sporadically

Fig. 96. Genealogy showing inferred relationship between *Setomima* Enderlein and the Tribe Mormiini, and relationships within the Mormiini, based on apomorphic and plesiomorphic character states listed in the text.

criteria, summarised by Stephens (1980) and Arnold (1981). Corresponding plesiomorphic states are in parentheses.

1. Ascoids exceedingly long, annulated, sclerotised, giving antenna pectinate appearance (ascoids short, smooth-surfaced, not especially sclerotised).
2. Ascoids short, often branched (reversion from apomorphism 1 to state resembling primitive state for subfamily).
3. Palpal segment 2 exceptionally long, 1,5–2,0 times length of seg. 3 and more than 2,0 times length of seg. 1 (seg. 2 less than 1,5 times length of seg. 1, usually about equal to seg. 3).
4. Palpal seg. 2 less than 1,5 times length of palpal seg. 1 and about equal to seg. 3 (reversion from apomorphism 3 to state resembling primitive state for subfamily).
5. Presence on palpal seg. 1 of compact rounded cluster of sensory rods (sensory rods scattered).
6. Palpal seg. 2 articulated on ventral side of seg. 1, subterminally (seg. 2 articulated terminally).
7. Flagellomeres longitudinally striated (not striated).
8. Flagellomere 1 diminutive (normal in size).
9. Basal flagellomeres closely juxtaposed, necks very short or absent, basal bulbs enlarged on side where ascoids are inserted—eg. see Fig. 71 and Quate & Quate's (1967) figures for *Gerobrunettia* (these flagellomeres well separated, necks short or rim-like but distinct, basal bulbs not especially enlarged where ascoids are inserted).
10. Flag. 2 with 3 ascoids (2 ascoids).
11. Last 2 flagellomeres reduced and narrowly separated, but last retaining apiculus (last 2 normal in size and degree of separation).
12. Antenna with 13 flagellomeres (14 flagellomeres).
13. Last flagellomere elongate (normal in length).
14. No vestiture on wing membrane (wing membrane covered with hair or scales).
15. Wing with macrotrichia restricted to bases and tips of veins (macrotrichia along lengths of veins).
16. Presence of discrete rounded second costal node (no second costal node).
17. Eyebridges contiguous, of 3 facet rows (eyebridges separated medially, of more than 3 facet rows).
18. Frontal scar patch divided by median scar-free band (scar patch undivided).
19. Distal region of aedeagus with 2 long, sclerotised parallel valves (distal region of aedeagus indistinct, not sclerotised).
20. Aedeagus flanked by broad-based symmetrical parameres that exceed it and that originate under post-hypandrial plate (parameres asymmetrically arranged).
21. Aedeagus symmetrical, basically racquet-shaped with narrow, parallel-sided apodeme (asymmetrical, not racquet-shaped, with broad dorso-ventrally flattened apodeme).
22. No ball-and-socket articulation (ball-and-socket articulation between aedeagal apodeme and gonocoxal apodemes).

23. No hair on style (style hairy).
24. No hair on coxite (coxite hairy).
25. Coxites subspherical and styles sickle-shaped with 2 sclerotised apical teeth (coxites elongate, styles not sickle-shaped, without apical teeth).
26. Retinacula of two types, arranged in 2 groups (retinacula all similar in form, not separated into groups).
27. Presence of long slender proximal retinacula with variously elaborated clavate tips (no such retinacula present). These retinacula are a particular feature of the *Setomima–Gerobrunettia–Brunettia* group of genera. They also occur in *Alepia* and *Trichopsychoda* (see footnote on p 263), but are not otherwise known in Psychodidae. Particularly notable is the occurrence in *Gerobrunettia* of bell-tipped retinacula, seen also in *Brunettia* (eg. *sinuosa* Quate & Quate), *Alepia* and *Trichopsychoda*, but not *Setomima*. These were overlooked by Quate and Quate (1967) and have not previously been remarked upon. The angulated retinacula (see 31) that occur in most *Brunettia* species have tips that are readily derived from those of the long flexible retinacula of *Setomima gloriosa* (Fig. 62) by loss of the hooded apex and shortening of the pre-apical serrated region.
28. One group of retinacula uniseriate (retinacula scattered).
29. Retention of distal retinacula of setomimoid ancestor and loss of proximal retinacula (both proximal and distal groups present).
30. Retinacula all short, clavate, prostrate (retinacula of two distinct types).
31. Cercopods very short, bearing angulated retinacula with elaborate enlarged tips (cercopods normal in length, without angulated retinacula). Angulated retinacula are only known in *Brunettia* and *Gerobrunettia*. Their presence in *Gerobrunettia* was overlooked by Quate & Quate (1967) and is here noted for the first time.
32. No connection between ventral epandrial plate and gonocoxal apodemes (tip of ventral epandrial plate joined to gonocoxal apodemes).
33. Tips of hypandrial arms fused to epandrium (hypandrial arms separated from epandrium by discontinuity or articulation).
34. No hair on epandrium (epandrium with patches of hair ventrally).
35. Female subgenital plate very short, distal lobes completely separated at base, generally parallel, and with massive posterior lobe of genital sac projecting tongue-like between them (subgenital plate longer than broad, distal lobes joined at base, generally divergent, and genital sac not projecting between).

The genealogy (Fig. 96) begins with a maruinine stem form that probably resembled present day species of *Setomima* s. str. Its specialisations are retained in *Setomima* but Mormiini tend towards simplification of structure: more derivative subgroups have progressively lost specialisations, including those of male genitalia, antennae and palpi, giving descendants that in some ways are closer in structure to the common ancestor of Psychodinae. The aedeagal complex reverts to its ancestral symmetry and loses the ball-and-socket linkage; the aedeagal apodeme narrows and ultimately becomes rod-like; the ascoids lose their annulations and are reduced to almost unsclerotised structures, little if any longer than the flagellomeres bearing them; the second palpal segment is reduced until about equal to the third, and the wing membrane loses its covering of hairs or scales and develops macrotrichia along the lengths of the veins.

I feel confident that this genealogy is essentially correct. The alternative is to derive Mormiini and *Setomima* from separate ancestors, involving a degree of detailed convergence of peculiar features that is improbable.

Apomorphisms 26 and 27 have been independently lost in *Ophryosetomima* and *Mormia.*

It is inferred that apomorphisms 2, 14 and 17 were independently evolved in *Brunettia* and *Mormia*, and 33 in *Gerobrunettia* and *Mormia.*

Either apomorphism 28 was independently evolved in *Setomima* and *Brunettia*, or it belongs to the basal set in this genealogy, in which case it has been lost on at least 3 occasions (in *Ophryosetomima*, *Gerobrunettia* and *Mormia*).

Mormia was apparently an early offshoot of the mormiine lineage. Hence its combination of advanced apomorphisms with various plesiomorphic features present in *Setomima* but not seen or rarely seen in *Brunettia* (retention of connection between ventral epandrial plate and gonocoxal apodemes; retention of vestiture on coxite and style; retention of 14 flagellomeres; epandrium hairy, with paired pseudospiracular openings). However, the position of the corresponding branching point as shown in Fig. 96 is very tentative. On the evidence of the above genealogy the Setomimini of Vaillant is the sister group of the Mormiini, but until critical areas of the Maruinini, containing forms that resemble *Setomima*, are better known, I leave *Setomima* in the Maruinini.

Wagner & Vaillant's (1983) statement that *Parasetomima* Duckhouse 'is at the limit' between the *Setomima* and *Gerobrunettia* groups of genera seems to be without foundation. They do not discuss it. Vaillant (1982*b*) places *Parasetomima* in the Mormiini (= Brunettiini *sensu stricto* of Vaillant). However, as shown by its genital apodemes and other features *Parasetomima* is a genus of Maruinini, far less closely related to Mormiini, whose advanced genital features it lacks, than to *Setomima*, which in the same paper he places in a new tribe, Setomimini. The affinities of Setomimini he sees as lying not with Mormiini but with *Maruina* Müller. Wagner & Vaillant also say *Oreoscopus* Quate & Quate represents a link between the Paramormiini (= Telmatoscopini of Vaillant) and the *Brunettia* group of genera. As pointed out by Duckhouse (1978), *Oreoscopus*, erected by Quate & Quate (1967) as a subgenus of *Telmatoscopus*, is a junior homonym of the wren genus *Oreoscopus* North and forms part of *Peripsychoda* Enderlein. This relationship can be amply supported. In this paper I shall not discuss it further.

Tribe Mormiini

Mormiini Enderlein, 1937: 98.
Brunettiini Vaillant, 1975: 156, **syn. n.**

Mormiini resemble Maruinini more or less closely in wing venation but have lost the ancestral ball-and-socket linkage between gonocoxal and aedeagal apodemes. Neither is there a furca.

Genus *Mormia* Enderlein

Mormia Enderlein, 1935: 248.

The plesiomorphic southern African *Mormia* species described by Duckhouse (1978) are here regarded as members of a new subgenus.

Subgenus **Afromormia** subg. n.

Derivation: *Africus* (L.) = African + *Mormia*.
Gender: Feminine.
Type-species: *Mormia dycei* Duckhouse, by present designation.

Male. Pedicel symmetrical, little longer than broad, without distal process; no porthole organs; basal flagellomeres (Duckhouse 1978, Fig. 111) eccentric, basal bulbs strongly enlarged on inner side adjacent to ascoids and on outer side 'straight backed', somewhat constricted at base of neck but tending to swell above constriction; 1st flagellomere fully developed, with both neck and ascoids; ascoids paired, palmate, absent from last 2 flagellomeres, which are diminutive. Eye-bridges contiguous across their entire width; facets large. Palpi normal. Thoracic allurement organs absent. In dorsal view, style convex on outer side; in apical third, twisted inwards and medial surface flattened. Aedeagus compact racquet-shaped; its apodeme slender, usually T-shaped apically; intromittent region with rim forming complete sclerotised O; at base of O arise a pair of parallel internal sclerotisations, appearing beyond posterior limit of rim as pair of medial points, or fused to form single median sclerotisation confined within rim. Aedeagus flanked by pair of triangular parameres, their points directed posteriorly, which do not become incorporated into aedeagus. Cercopod with 3–6 retinacula.

Species included in subg. Afromormia (all Afrotropical):

acrostylis Duckhouse, *dycei* Duckhouse, *flagellifer* (Freeman), *triangulata* (Wagner).

Wagner (1979) incorrectly classified *flagellifer* and *triangulata* in *Rhadinoscopus* Quate & Quate, treated by him as a separate genus. Although males of *Afromormia* have similarly eccentric basal flagellomeres with palmate ascoids (Duckhouse 1978, Fig. 111) they lack the following critical features of *Rhadinoscopus*: the wing does not have R_5 ending at an acutely pointed tip, the R fork is distal to the M fork and the aedeagus is always racquet-shaped rather than more or less elongate, parallel-sided and tubular.

Tribe Paramormiini

Paramormiini Enderlein, 1937: 96 (as subtribe).
Telmatoscopini Vaillant, 1971: 37, partim, **syn. n.**

Psychodinae with flask-shaped flagellomeres, necks distinctly parallel-sided although sometimes very short. First flagellomere not fusiform or subspherical; if almost so, not reduced but as large or larger than second. Last 3 flagellomeres sometimes smaller and showing reduction of necks, but never subspherical and diminutive, and never showing fusion; all except occasionally the last with ascoids like those on more basal flagellomeres; verticils generally dense and cupuliform in ♂. Frontal hair patch undivided. Wings held horizontally. Wing membrane naked or with limited incursions of vestiture (eg. *Paramormia* subg. *Parapanimerus* Wagner **comb. n.**, *Elsahowia* Duckhouse). Except in some *Neotelmatoscopus*, origin of R_{2+3} at or before apex of basal radial cell (R_s not pectinate); Sc sometimes long, never especially short.

Aedeagus nearly always bilaterally symmetrical; gonocoxal apodemes not forming ball-and-socket articulation with aedeagal apodeme but primitively linked to it by a V-shaped furca (see discussion below). More than one retinaculum present.

As shown by Duckhouse (1985), a series of genera united by Vaillant with *Telmatoscopus* and other Paramormiini are Psychodini. Other workers (eg. Wagner, 1977; Salamanna, 1982) have so far followed Vaillant.

Paramormiini form an important part of the Holarctic psychodid fauna but are poorly represented in the Afrotropics. Vaillant recognises a series of genus groups, mostly formed by splitting the old genus *Telmatoscopus* Eaton. Of these, *Krekiella* Vaillant, 1972, type-species *Pericoma labeculosa* Eaton, also contains the type-species of *Xenapates* Eaton, *Pericoma fraudulenta* Eaton (type-species by monotypy). *Xenapates* was originally proposed by Eaton (1904) and subsequently used as a full genus by Enderlein (1935 1937). *Krekiella* is therefore a subjective synonym of *Xenapates*, **syn. n.** A further subjective synonym of *Xenapates* is *Seoda* Enderlein, 1935, whose type-species, *Pericoma labeculosa* Eaton, is a species of *Xenapates*, **syn. n.**

I use *Telmatoscopus* in a broader sense than Vaillant, including within it as subgenera: *Panimerus* Eaton, *Xenapates, Jungiella* Vaillant, *Crenopanimerus* Vaillant and *Eutelmatoscopus* Satchell. I also include various species such as the Afrotropical *Telmatoscopus pentacus* Duckhouse that do not readily fit into any of these subgenera.

Genus *Elsahowia* Duckhouse

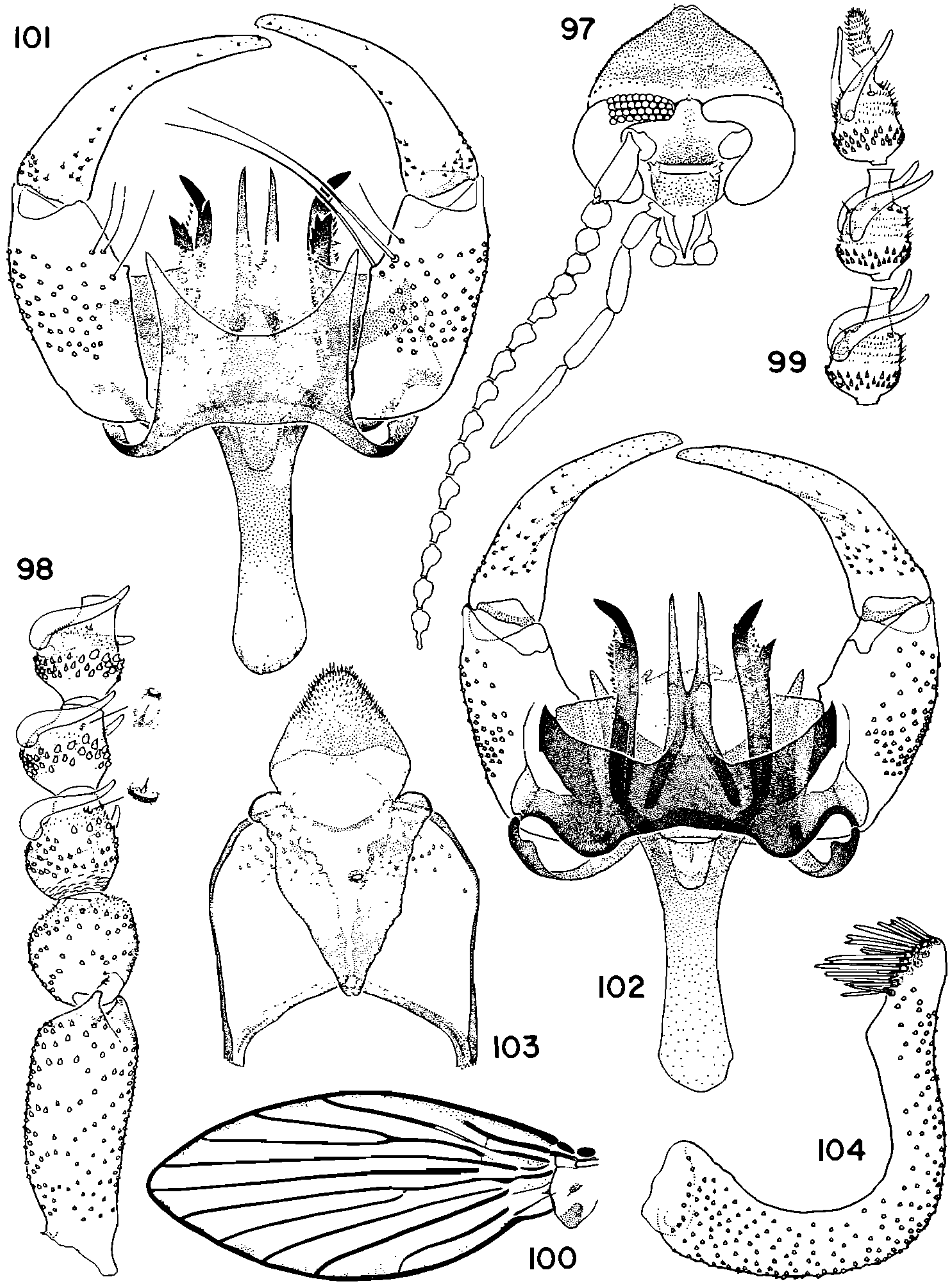
Elsahowia Duckhouse, 1978: 353.

Elsahowia is a plesiomorphic genus of Paramormiini and thus resembles other plesiomorphic elements in the tribe. It is restricted to the Afrotropical Region including Madagascar, and on the mainland is known from latitude 32°S, north to latitude 10°S.

Elsahowia zombae sp. n.

Similar to *natalensis* but coxite equal to or shorter than style, and hypandrium with strong lateral processes flanking median concavity.

Male. Vestiture unknown. Head (Fig. 97) 0,92 times as long as broad. Occipital region without flanges. Vertex longer than in *natalensis*, not especially inflated; scars of 2 types as in *natalensis*, those on anterior vertex smaller with less developed rims. Eyebridges with only 4 rows of facets, separated by about 3,9 facet diameters, connected as shown. Scar patch on frons with weaker median extension than *natalensis*. Cuticle around antennal insertion areas and posterior to fronto-clypeal suture unwrinkled. Palpi (1,0–1,7–1,8–3,0) 1,46 times length of head. Antenna (Figs 98–99) 1,94 times length of palp and 0,5 times length of wing; scape about 0,4



Figs 97–104. Male of *Elsahowia zombae* sp. n.: (97) head; (98) base and (99) tip of antenna; (100) wing, stippling showing distribution of hair scars; (101) forceps and aedeagus, dorsal; (102) forceps and aedeagus, ventral; (103) epandrium; (104) cercopod, lateral.

times length of pedicel, minute sensory setae at base often clustered; pedicel subspherical; flagellomeres with very short necks, up to about 0,76 times length of basal bulb (8th flagellomere); first 3 with dorsal sensory pits shallow, or sometimes sunken to form vesicle with small apical aperture (insets to Fig. 98), ventral pits smaller; last flagellomere with apiculus about 0,9 times length of basal bulb. Ascoids short, sinuous, inflated.

Wing (Fig. 100) well sclerotised, not enlarged in anal and humeral regions. Veins in general dark but R_1 very pale or unsclerotised at about level of tip of Sc. R fork beyond M fork; Sc shorter than *natalensis*, curved towards costa but reaching less far and not enlarged apically; CuA_2 not arched basally as in *natalensis*; membrane with hair scars mostly restricted to compact areas between tips of veins R_1–CuA_2 and along costa basal to tips of R_1 and CuA_2, none more centrally as in *natalensis*. Winglength 2,4–2,6 mm.

Terminalia (Figs 101–104). Coxite stout, with dorsomedial knob at base; massive sensory setae (Fig. 101, shown on LH coxite only) more distal than in *natalensis*; style larger, about 1,02 times length of coxite. Hypandrium even more enlarged than *natalensis* (region between coxites with rounded lateral lobes of *natalensis* enlarged to form triangular processes flanking deep median concavity); arms articulated ventrally with anterior margin of gonocoxal apodemes. Aedeagal apodeme far narrower than in *natalensis*. Lateral shafts of aedeagus each contiguous with pair of slender sclerotised rods, joined at base, probably derived from parameres; apices of rods toothed and darkly sclerotised; outer rod with membranous lateral extension set with numerous small triangular teeth. In ventral view (Fig. 102) fused gonocoxal apodemes (= intercoxital sclerite of Duckhouse, 1978) forming broad plate, its anterior margin with thickened rim bearing small lateral condyles for articulation with hypandrium; its posterior margin with median process. Dorsal surface of gonocoxal apodemes connected with lateral shafts of aedeagal apodeme, which lie above, by a furca, consisting of 2 divergent furcal arms, arising together at base of median process; furca also prolonged backwards as pair of parallel tapered spines, aedeagus-like in appearance, running across median process and far beyond, to level of tips of coxites. Posterolateral (posterior) wings of gonocoxal apodeme contiguous laterally with lateral margins of post-hypandrial plate. Epandrium (Fig. 103) proportionately longer than in *natalensis*, deeply excavated anteriorly, narrower with more rounded shoulders posteriorly. Ventral epandrial plate V-shaped, arms converging from bases of cercopods to point above anterior concavity of epandrium, where they are linked by membrane but do not fuse. Cercopod strongly curved, heel on upper surface, basal to retinacula.

Material examined: Holotype ♂, MALAŴI, Zomba Plateau, montane forest, 1500 m, 1535Ad, 24–27.xi.1980 (Stuckenberg & Londt). Paratypes: 2♂, with holotype.

Elsahowia natalensis Duckhouse

Elsahowia natalensis Duckhouse, 1978: 355.

Specimens of *Elsahowia* collected by Dr Young in Tanzania appeared at first sight to represent a new subspecies of *natalensis*, but after re-examination of the full series of *natalensis* from South Africa it was evident that they fell within its range of variation. Nonetheless, the specimens show some differences from the holotype, figured by Duckhouse (1978). I have therefore drawn the parts involved (Figs 105–106). From the drawings it is seen that the head may sometimes be proportionately narrower than in the holotype (0,95 times as long as broad), with stouter eyebridges, and with scape longer, extending to margin of eye. The ventral epandrial plate may be arched strongly forward and thus reach level of anterior margin of epandrium.

Material examined: 4♂, 2♀, TANZANIA, 6,5 miles S of Morogoro, wet forest, 490 m, flight trap, 26–27.xi.1982 (D. G. Young).

In *Elsahowia zombae* the gonocoxal apodemes and furca resemble those of *Paramormia*, subg. *Parapanimerus* and to a lesser extent *Telmatoscopus* subg. *Xenapates* (Duckhouse, in preparation). I here suggest that in the stem form that gave rise to the Paramormiini the articulation between aedeagal apodeme and gonocoxal apodemes was of the 'ball-and-socket' type seen in Psychodinae of the Tribe Maruinini. The taxonomic and geographical distribution of this higher level apomorphism leaves little doubt that it was widespread amongst Mesozoic Gondwanian Psychodinae. The tips of the furcal arms of *Elsahowia* and other Paramormiini appear to correspond with the dome of the 'ball', which fits into a cavity on the underside of the aedeagal apodeme (the 'socket'). Hence the articulation between furcal arms and the inner surfaces of the thickened margins of the aedeagal apodeme, that in Paramormiini form its lateral shafts. That the furcal arms in *Elsahowia* are not fully united at the base may be a consequence of the fact that in the archaic ball-and-socket type articulation the ball is developed from a pair of dorsal processes formed where the left and right gonocoxal apodemes meet. In the adult fly this juxtaposition appears in dorsal view as a median line of demarcation between the two, visible in virtually all psychodids with a ball-and-socket articulation. Thus, the fusion is not complete.

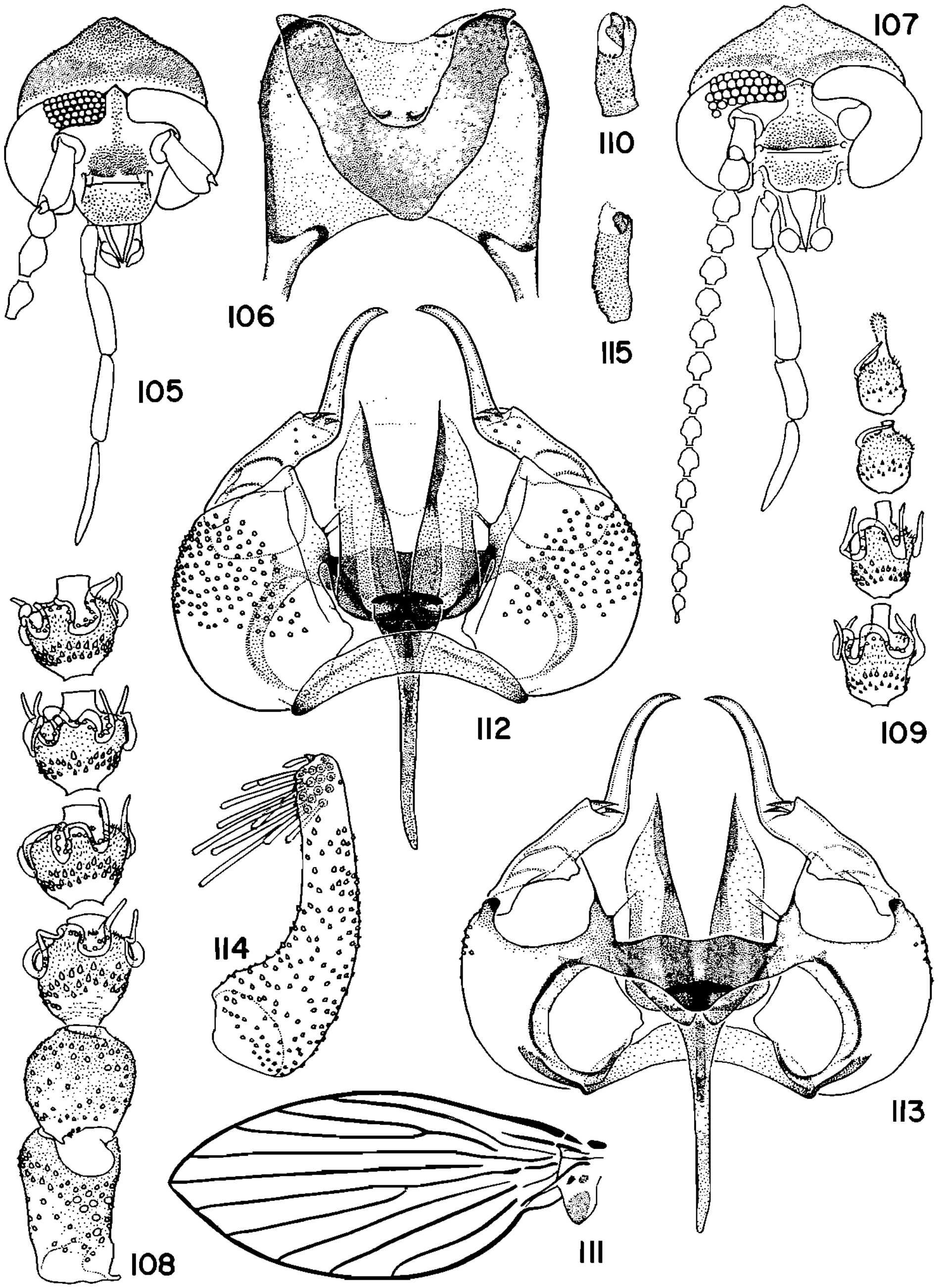
Two features of *Elsahowia zombae* are interesting from a phylogenetic standpoint because they are also encountered in some Palaearctic groups. Both are plesiomorphic: (i) Presence of prominent furcal processes posteriorly (also seen in *Paramormia* subg. *Parapanimerus* and *Telmatoscopus* subg. *Xenapates*). (ii) Articulation of furcal arms on *inner surfaces* of lateral shafts of aedeagal apodeme (also seen in *Paramormia* subg. *Paramormia; Telmatoscopus* subg. *Jungiella* (*longicornis* group); *Telmatoscopus* subg. *Xenapates* (*fraudulentus* group)).

In more advanced species of subg. *Jungiella* the furcal processes are lost, and the furcal arms have rotated onto the *outer* surfaces of the lateral shafts. Loss of the furcal processes occurs even in some *Elsahowia (natalensis)*.

Genus *Clogmia* Enderlein

Clogmia Enderlein, 1937: 87.

This genus appears to be less well represented in the Afrotropics than in other warm parts of the Old World. The following new species from Malaŵi is related to *C. coronata* Duckhouse, described from a single damaged male, so mounted that the aedeagus was only visible in lateral view. Thus, the structure of the aedeagus in *odontostylis* sp. n. may help to place both species.



Figs 105–115. (105–106) Male of *Elsahowia natalensis* Duckhouse from Tanzania: (105) head; (106) epandrium. (107–114) Male of *Clogmia odontostylis* sp. n.: (107) head; (108) base and (109) tip of antenna; (110) 1st palpal segment; (111) wing; (112) forceps and aedeagus, dorsal; (113) forceps and aedeagus, ventral; (114) cercopod, lateral. (115) Male of *Clogmia coronata* Duckhouse, 1st palpal segment.

Clogmia odontostylis sp. n.

Distinguished from other *Clogmia* species by the characteristic styles, which bear a pair of strong ventral teeth, midway from base to tip.

Male. Vestiture unknown. Head (Fig. 107) only 0,75 times as long as broad, clypeus not extending beyond level of eyes. Eyebridges with 4 rows of facets, tapered to 3 medially, separated by 1,9 facet diameters, linked by obtusely angled interocular suture at level of 2nd facet row; immediately behind eyebridges, scars more concentrated and more translucent in appearance, most with faintly discernible central papilla; no median scar-free band. Frons with scar patch undivided, on protuberant lobe, very narrowly separated from fronto-clypeal suture; median extension to level of interocular suture. Palpi (1,0–2,0–1,1–1,5) 1,71 times length of head, incrassate, seg. 1 with characteristic basal sclerotisation as in Fig. 110 (compare *coronata* Duckhouse, Fig. 115); seg. 2 with scattered hyaline sensory rods dorsolaterally, in basal third. Labellum rather slender. Antenna (Figs 108–109) 1,5 times length of palp and 0,5 times length of wing. Scape 1,39 times length of pedicel; flagellomeres extremely short-necked, on flag. 1 about 0,15 times length of basal bulb, lengthening to about 0,43 times length of basal bulb on flag. 12; 2 frilled ascoids on flags. 1–12, each with undulating line of rounded hyaline areas marking points of attachment; last 2 flagellomeres reduced, with pair of small digitate ascoids, enlarged at bases.

Thorax without allurement organs; prothorax with dorsolateral scar patches small, about 17 scars in vertically orientated band. Wing, Fig. 111; pointed, general shape as in *coronata* Duckhouse. M fork at level of CuA_2; R fork basal to M fork; R_1 with unsclerotised zone above mid-region of stem of R fork; M_2 weakened at base. Winglength 2,1 mm.

Terminalia (Figs 112–114, 135). Forceps: coxite strongly inflated laterally, microsetose in region covered by hair scars, strong triangular projection distally on inner side; style 1,15 times length of coxite, similar to *coronata* but less slender and less obviously sinuous, point corresponding to most basal curve in *coronata* bearing 2 stout pointed teeth on ventral side, no teeth beyond this point. Hypandrium broad, no sensilla visible, ventral arm closely attached to ventral rim of coxite. Aedeagal complex with 2 acutely pointed lateral pieces, darkly sclerotised on inner margins, divergent; aedeagal apodeme narrow and parallel sided in dorsal view. Gonocoxal apodemes (Fig. 113) very posterior in position, forming transverse plate with broad triangular projection anteriorly, rounded at apex. Epandrium (Fig. 135) about 2,4 times as broad as long, single wide pseudospiracular opening, 2 lateral scar patches, lateral margins curved inwards to form strong rim. Ventral epandrial plate divided medially, lateral arms (articulating with cercopods) more sclerotised than remainder, anterior arms narrowly separated, pointed, apparently not connected with gonocoxal apodemes. Cercopods with numerous retinacula distally on inner side.

Material examined: Holotype ♂, MALAŴI, Zomba, 1535Ad, 1100 m, at light, 24–27.xi.1980 (J. Londt & B. R. Stuckenberg). Paratype: 1♂, Malaŵi, Mulanje Mtn, Likabula river valley, 1535Dc, 1000 m, riverine *Brachystegia* woodland, 28–30.xi.1980 (Stuckenberg & Londt).

Tribe Psychodini

Psychodini Enderlein, 1935: 246.

This tribe was discussed in detail by Duckhouse (1985).

The tribal position of the two remaining genera dealt with in this paper is obscure.

Genus *Mystropsychoda* Duckhouse

Mystropsychoda Duckhouse, 1975: 445.

Since I described this genus, more specimens have been collected, allowing me to now complete the description of *M. rhodesiensis* Duckhouse and describe southern material of *M. pallida* (Tonnoir).

As observed by Dr Stuckenberg, in *Mystropsychoda* the wings are held horizontally. Males have ventrally inserted cornicula, flanking the occipital foramen. These differ from those of all other Psychodinae in being relatively rigid structures with exceptionally sparse pits, curved forward so that they follow the line of the head, beneath which they are concealed in *rhodesiensis* (Fig. 123). The head is naked ventrally. The occipital foramen is exceptionally broad, as in most *Psychoda* species. The antenna has a basal ridge or collar on the 1st flagellomere. Immediately anterior to the clypeus is a small conical invagination, sometimes expanded at the inner end.

Mystropsychoda rhodesiensis Duckhouse

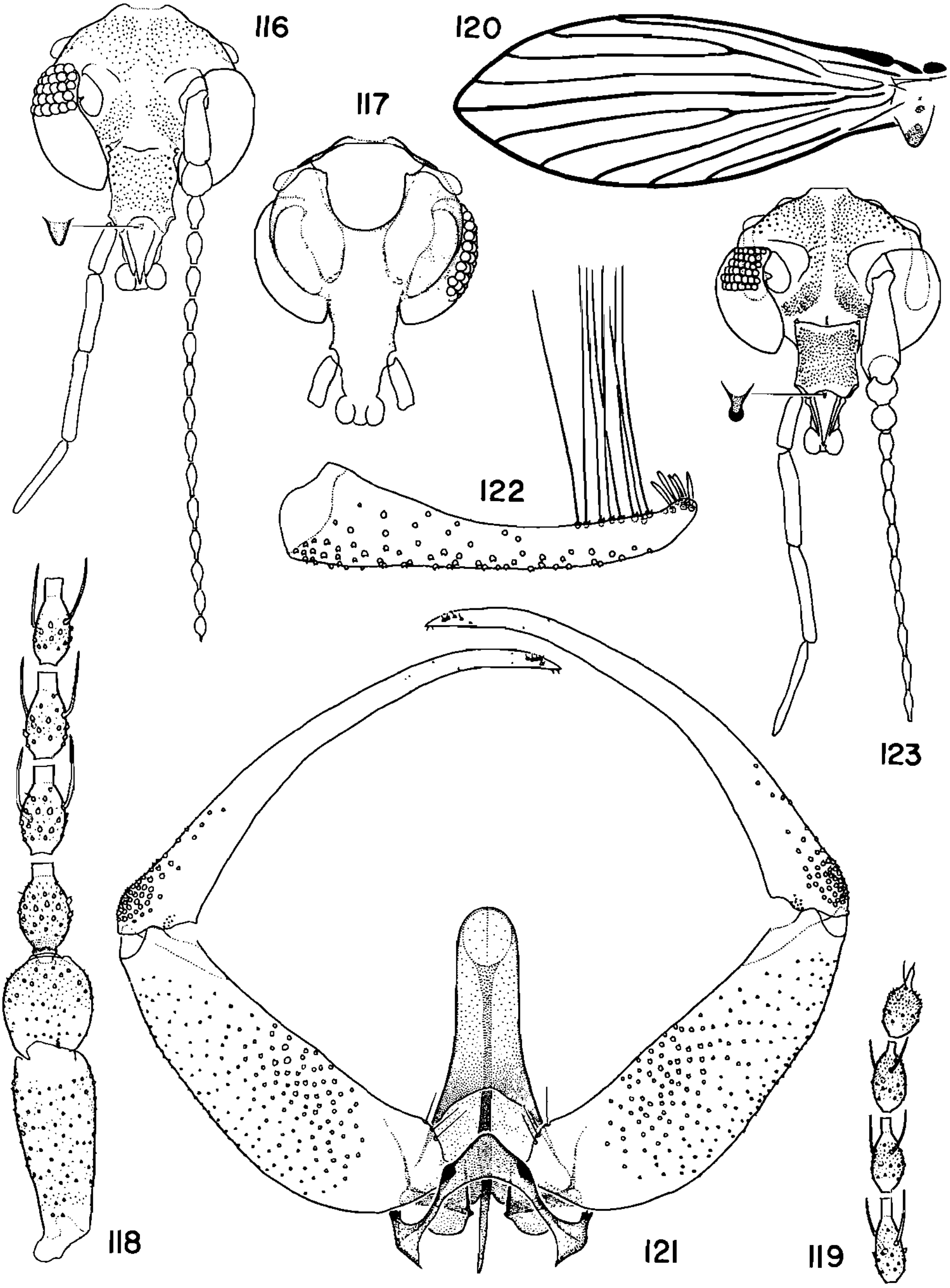
Mystropsychoda rhodesiensis Duckhouse, 1975: 445.

The male I described was faded and lacked clypeus and mouthparts. I now provide additional information from fresh material collected in Malaŵi.

Male. Large species. Exoskeleton well sclerotised. Head (Fig. 123) reminiscent of a phlebotomine. Eyes protuberant and angular anteriorly, on either side of clypeus; facets small. Cornicula rigid, adpressed to ventrolateral surface of head instead of projecting laterally, finely microsetose, without pits. Palpi, 1,0–1,5–1,6–1,7, very long, 1,63 times length of head. 1st palpal segment with fine hyaline rods distally, on outer side. Labellum compact and bulbous. Antennal scape long, 0,5 times length of head. Pedicel squat, shorter than broad. Postpedicel eccentric and eccentrically articulated, anterior articulation far below longitudinal axis and structure thus strongly domed dorsally, as readily seen in lateral view (♀ postpedicel not eccentric); basal collar a sharp ridge. Hyaline spines with very enlarged sockets dorsomedially on flagellomeres 1–3. Ascoids on flagellomeres 3–13. Clypeus longer than broad, projecting far beyond level of eyes so that mouthparts are effectively at apex of proboscis. Invagination anterior to clypeus longer than broad, conical, sometimes expanded at inner end (Fig. 123, inset).

Winglength, Malaŵi specimens, 3,0–3,3 mm.

Scoop-like portion of 'aedeagus' forming capacious sheath around the narrow aedeagal apodeme; contiguous basally with gonocoxal apodemes; apparently formed by sclerotisation of phallus sheath and therefore comparable with post-hypandrial plate of other Psychodinae. Gonocoxal apodemes fused to form a simple transverse plate beneath aedeagus, apparently contiguous posteriorly with



Figs 116–123. (116–122) Male of *Mystropsychoda pallida* (Tonnoir): (116) head; (117) head, ventral; (118) base and (119) tip of antenna; (120) wing; (121) forceps and aedeagus; (122) cercopod, lateral. (123) Male of *Mystropsychoda rhodesiensis* Duckhouse: head.

ventrally inclined sides of post-hypandrial plate. Epandrium (Fig. 124) with 2 lateral groups of hair scars ventrally, flanking naked and unsclerotised median third; ventral epandrial plate furcate, anterior angle rounded, posterior arms articulating with bases of cercopods but not connected with tenth tergite unless by membrane. In these specimens, hypandrium finely microsetose.

Material examined: MALAŴI: 2♂, 1♀, Ntchisi forest reserve, montane forest and woodland, 1500 m, 3–4.xii.1980 (Londt & Stuckenberg); 2♀, Zomba Plateau, montane forest, 1500 m. 13–14.xii.1980 (Stuckenberg & Londt); ZIMBABWE: 1♂, N. Vumba, 4.iv.1964 (D. Cookson).

Mystropsychoda pallida (Tonnoir)

Psychoda pallida Tonnoir, 1922: 16.

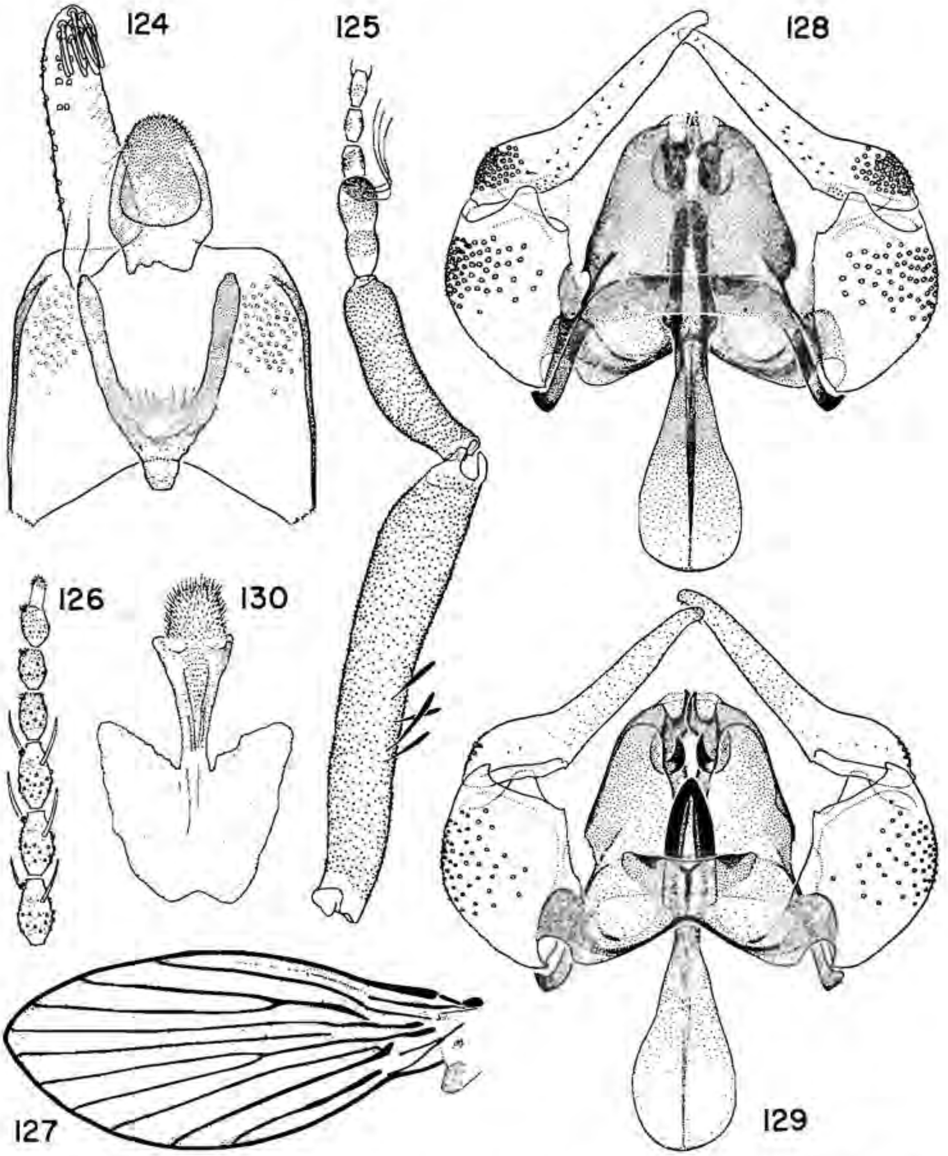
Tonnoir's description was based on one male from Ghana and two from the Congo. The Ghanaian male was reared from a pupa. Three further males, apparently the same species, have now been collected in Natal at Lat. 29° 45'S, thus extending the distribution of *pallida* some 35° of latitude further south.

Male. Small species. Exoskeleton very pale; visibly sclerotised on parts of wing, which thus appears transversely banded and darker at tips of veins, and also around rims of eyes, at tip of intromittent organ and in distal halves of styles.

Denuded head (Fig. 116) similar to *rhodesiensis* but invagination anterior to clypeus (Fig. 116, inset) always conical. Anterior tentorial pits widely separated from scars on frons. Eye facets large. Cornicula very small, about size of flagellomere 1, finely microsetose and with scattered pits. Palpi, 1,0–1,5–1,6–1,5, shorter than *rhodesiensis*, 1,36 times length of head. 1st palpal segment with hyaline rods as in *rhodesiensis*. Antenna (Figs 118–119) 0,57 times length of wing. Scape shorter than *rhodesiensis*, only 0,3 times length of head. Pedicel ovate, longer than broad. Postpedicel symmetrical, and symmetrically articulated, with short distal neck and equivalent basal constriction; basal collar rounded. Flagellum without spines or noticeably enlarged sockets. Flagellomeres with necks darker than basal bulbs, raised collar at point of junction with basal bulb as in *rhodesiensis*. Pair of sensilla on flagellomeres 1–3. Ascoids on flagellomeres 2–13.

Wing (Fig. 120). Membrane with hair almost entirely restricted to small marginal patches between tips of R_1–CuA_1. M fork at same level as R fork; M_1 and M_2 beyond bifurcation as thick and strongly divergent as R_2 and R_3; M_{1+2} arched weakly upwards at base. Winglength 1,67 mm.

Terminalia (Figs 121–122). Gonopods very slender, disproportionately long, held in arms akimbo position. Style blade-like, 1,2 times length of coxite, group of 4–6 minute preapical sensory setae dorsally. Aedeagus a slender rod, narrowing anteriorly to filiform apodeme; surrounded posteriorly by slender sheath which is connected with bases of coxites and apparently formed from post-hypandrial plate. Apex of aedeagal sheath indistinct but apparently scoop-like, rather as in *rhodesiensis*. Hypandrium broadened posteriorly to form angular median lobe and 2 smaller lateral lobes above parabasal processes of coxites, with which they appear to articulate. Gonocoxal apodemes with deep V-shaped median emargination flanked by 2 longitudinal sclerotisations. Epandrium with ventral plate furcate as in



Figs 124–130. (124) Male of *Mystropsychoda rhodesiensis*, epandrium. (125–130) Male of *Clytocerus excelsior* sp. n.: (125) base and (126) tip of antenna; (127) wing, stippling showing pattern of sclerotisation; (128) forceps and aedeagus, dorsal; (129) forceps and aedeagus, ventral; (130) ventral epandrial plate and 10th tergite.

rhodesiensis; tenth tergite distinctly triangular. Cercopod slender, evenly tapered from base to apex; cluster of 6–7 very small retinacula at apex; line of non-deciduous hairs (possibly very slender retinacula) equal to about two-thirds length of cercopod.

Material examined: SOUTH AFRICA: 1♂, Natal, Ashburton, 15 km SE of Pietermaritzburg, grassland with *Acacia* trees, 19–25.ii.1977 (J. Londt); 3♀, E. Transvaal, Komatipoort, light trap, 25–26.ii.1974 (A. L. Dyce); 1♀, E. Transvaal, Spekboom River, Mooiplaas, light trap, 28–29.i.1974 (Dyce); 2♂, same locality, light trap, 20.xi.1973 (Dyce); 2♂, Zululand, St. Lucia Estuary, riparian woodland, at light, 7.x.1983 (B. R. Stuckenberg). BOTSWANA: 2♀, Xugana Island, 22–26.xi.1979 (B. H. Lamoral).

Satchell (1956) recorded *pallida* from Rhodesia, but I have not seen his specimens. Since *pallida* does occur in Rhodesia it is probable that his identification was correct.

Mystropsychoda appears to breed in streams: Tonnoir (1922) described a pupa of *pallida* taken from the stony bed of a forest stream, and Wagner (1979) records *obscura* from a mountain stream in Zaïre.

Genus *Clytocerus* Eaton

The following new species is a member of the *palliolatus* group, possibly closest to *constrictus* Duckhouse. For identification, the key on p. 428 in Duckhouse (1975) may be adapted by altering couplet 3 and inserting a new couplet, 3A, as follows:

3 Aedeagal capsule broad, rounded, not constricted or tapered; pedicel pyriform, only about 1,2 times length of post-pedicel . **palliolatus** Duckhouse
— Capsule tapered or strongly constricted 3A
3A Pedicel slightly curved, elongate pyriform, about 1,5 times length of post-pedicel; aedeagus with longest pair of processes widely separated........... **constrictus** Duckhouse
— Pedicel strongly curved, almost banana-shaped, about 2,0 times length of post-pedicel; aedeagus with longest pair of processes overlapping medially.... **excelsior** sp. n.

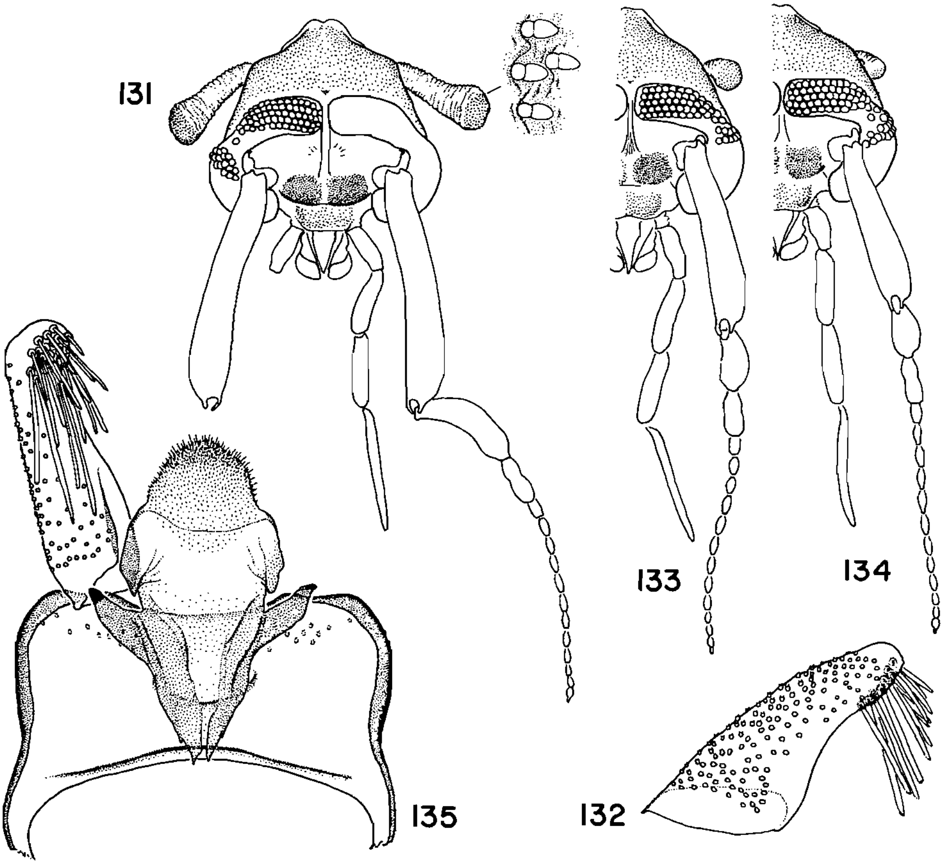
Contrary to my earlier suggestion that the hood or capsule enclosing the aedeagus in the *palliolatus* group is 'apparently a development of the ninth sternite' (Duckhouse 1975: 441), I now consider that it is more probably formed by sclerotisation of the phallus sheath. Hence it probably has the same origin in ontogeny as the post-hypandrial plate of other Psychodinae, but is not necessarily homologous. In more plesiomorphic *Clytocerus* species there is no post-hypandrial plate, but lateral areas of sclerotisation are sometimes present in the phallus sheath. These are very small in *chyuluensis* Satchell (Duckhouse 1975, Fig. 31), and considerably larger in *divaricatus* Duckhouse (Duckhouse 1975, Fig. 40). If the sclerotised areas developed further and finally coalesced the result would be a capsule as in the *palliolatus* group. I suggest that post-hypandrial plates may have arisen repeatedly in Psychodinae, so that presence or absence of such a structure should be treated with great caution in phylogenetic analysis. The capsule in the *palliolatus* group differs from a 'typical' post-hypandrial plate in that it is attached on either side to the dorsal rim of the coxite, but does not appear to be attached to the gonocoxal apodemes.

In males of *Clytocerus* the antenna is flexed strongly between scape and pedicel, and the structure of the joint is adapted to produce this effect.

Clytocerus excelsior sp. n.

A robust species with exceptionally long scape and strongly curved elongate pedicel.

Male. Head (Fig. 131) about 0,9 times as long as broad. Vertex with pair of obtuse prominences adjacent to points of insertion of cornicula, thus appearing angular in dorsal view. Occipital region with flange stout; apex broad, bilobed. Cornicula far larger than *constrictus* (Fig. 133) or *palliolatus* (Fig. 134), distal region with sensilla (Fig. 131, inset) waisted, without apical papilla. Eyebridges of 5 facet rows, curved downwards at inner ends, separated by distance of less than 1 facet diameter; small



Figs 131–135. (131–132) Male of *Clytocerus excelsior* sp. n.: (131) head, with inset showing structure of apex of corniculum; (132) cercopod, lateral. (133) *Clytocerus constrictus* Duckhouse, head. (134) *Clytocerus palliolatus* Duckhouse, head. (135) *Clogmia odontostylis* sp. n.: epandrium and cercopod.

area of darkly sclerotised cuticle on midline, in concavity, representing centre of interocular suture. Furrow on frons flanked by well-sclerotised cuticle, hence unusually conspicuous. Palpi (1,0–1,5–1,6–2,4) 1,46 times length of head. Antenna (Figs 125–126) 2,0 times length of palp and 0,57 times length of wing; scape and pedicel massive, scape 1,17 times length of head and 2,3 times length of pedicel; pedicel strongly curved, elongate, 2,0 times length of post-pedicel; hirsute sensory pits distributed as in *palliolatus*. Cibarium strongly sclerotised, posterior angles with large ear-like lobes.

Wing (Fig. 127) with R fork well basal to M fork. Winglength 3,0–3,25 mm.

Terminalia (Figs 128–130, 132) robust. Cuticular hood (post-hypandrial plate) around aedeagus widely open ventrally, partly fused to hypandrium but remaining separate laterally; attached to coxites by narrow sclerotised bars, extending onto surface of hood as pair of conspicuous ridges. In ventral view (Fig. 129), aedeagus with pair of curved bars, their backwardly directed tips pointed and pressed together like blades of forceps; 2 pairs of short thorn-like distal processes, tips directed backwards, the more dorsal pair placed further posteriorly and overlapping in midline. Gonocoxal apodemes fused medially to form a plate shaped like axe-head, the 'blade' with pair of small flaps flanking aedeagus reflexed onto its dorsal surface. Ventral surface of style with numerous small sensory pits, seen as colourless spots on brown sclerotised background. Style about 1,4 times as long as coxite, form as in *palliolatus*. Epandrium with ventral sclerites (Fig. 130) forming single uncorrugated plate, well sclerotised, very broad and rounded anteriorly, joined to tenth tergite by long narrow neck. Cercopod (Fig. 132) stout with long retinacula.

Material examined: Holotype ♂, MALAŴI, Zomba Plateau, montane forest, 1500 m, 24–27.xi.1980 (Stuckenberg & Londt). Paratypes: 3♂, with holotype; 1♂, same locality and collectors, 13–14.xii.1980.

REFERENCES

ARNOLD, E. N. 1981. Estimating phylogenies at low taxonomic levels. *Z. zool. Syst. Evolut.-forsch.* **19**: 1–35.

BOTOSANEANU, L. & VAILLANT, F. 1970. Trois Diptères Psychodidae nouveaux de Cuba. *Trav. Lab. Hydrobiol.* **61**: 173–183.

DUCKHOUSE, D. A. 1966. Psychodidae (Diptera, Nematocera) of Southern Australia: subfamily Psychodinae. *Trans. R. ent. Soc. Lond.* **118**: 153–220.

——— 1974. Redescription of the neotropical Psychodidae (Diptera, Nematocera) described by Rapp and Curran. *J. ent. (B)* **43**: 55–62.

——— 1975. Non-phlebotomine Psychodidae (Diptera, Nematocera) of southern Africa. I. Subfamily Psychodinae: *Pericoma, Clytocerus* and *Mystropsychoda* gen. n. *Ann. Natal Mus.* **22** (2): 421–448.

——— 1978. Non-phlebotomine Psychodidae (Diptera, Nematocera) of southern Africa. II. Subfamily Psychodinae: *Neoarisemus* and the brunettoid and telmatoscopoid genera. *Ann. Natal Mus.* **23** (2): 305–359.

——— 1980. *Trichomyia* species (Diptera: Psychodidae) from southern Africa and New Zealand, with a discussion of their affinities and of the concept of monophyly in southern hemisphere biogeography. *Ann. Natal Mus.* **24**: 177–191.

——— 1985. A re-examination of *Neomaruina* (Diptera, Psychodidae), with observations on its life-history and affinities and redefinition of the Tribe Psychodini. *Ann. Natal Mus.* **26** (2): 601–620.

DUCKHOUSE, D. A. & LEWIS, D. 1980. 3. Family Psychodidae. *In:* Crosskey, R. W. *(Ed.) Catalogue of the Diptera of the Afrotropical Region.* London: British Museum (Natural History): 93–105.

EATON, A. E. 1904. New genera of European Psychodidae. *Entomologist's mon. Mag.* **29**: 32–33.

Enderlein, G. 1935. Zur Klassifikation der Psychodinen. *Sber. B. Ges. naturf. Freunde Berl.* 1935: 246–249.

——— 1937. Klassifikation der Psychodiden (Dipt.). *Dt. ent. Z.* 1936: 81–112.

Fittkau, E. J. 1980. Ein Zoogeographischer Vergleich der Chironomiden der Westpalaearktis und der Aethiopis. *In:* Murray, D. A. *(Ed.) Chironomidae. ecology, systematics, cytology and physiology.* Oxford: Pergamon, 139–143.

Hennig, W. 1973. Diptera (Zweiflügler). *Handb. Zool. Berl.* **4**: 1–200.

I.C.Z.N. 1985. *International Code of Zoological Nomenclature 3rd ed.* Berkeley: University of California Press: 1–338.

McAlpine, J. F. 1981. Ch. 2. Morphology and terminology—adults, pp. 9–63. *In:* McAlpine, J. F. et al. *(Eds.) Manual of Nearctic Diptera.* 1. Hull, Quebec: Agriculture Canada, Research Branch, Monograph No. 27.

Quate, L. W. 1955. A Revision of the Psychodidae (Diptera) in America North of Mexico. *Univ. Calif. Publ. Ent.* **10**: 103–273.

——— 1959. Classification of the Psychodini (Psychodidae: Diptera). *Ann. ent. Soc. Am.* **52**: 444–451.

——— 1965. A taxonomic study of Philippine Psychodidae (Diptera). *Pacif. Insects* **7**: 815–902.

Quate, L. W. & Quate, S. H. 1967. A monograph of Papuan Psychodidae, including *Phlebotomus* (Diptera). *Pacif. Insects Monograph* **15**: 1–216.

Salamanna, G. 1982. Psychodinae of Sardinia. 1. Psychodini and Telmatoscopini, with descriptions of three new species (Diptera Psychodidae). *Boll. Soc. ent. ital., Genova* **114**: 183–192.

Satchell, G. H. 1953. The Australian Psychodidae (Diptera), Part 1. *Aust. J. Zool.* **1**: 357–418.

——— 1955*a*. New species of East and Central African Psychodidae. *Revue Zool. Bot afr.* **51**: 339–372.

——— 1955*b*. The genus *Trichopsychoda* Tonnoir (Diptera: Psychodidae). *Proc. R. ent. Soc. Lond. B.* **24**: 49–57.

——— 1956. Diptera (Nematocera): Psychodinae. *South African Animal Life* **3**: 399–403.

Stephens, P. F. 1980. Evolutionary polarity of character states. *Ann. Rev. Ecol. Syst.* **11**: 333–358.

Stuckenberg, B. R. 1962. The distribution of the montane palaeogenic element in the South African invertebrate fauna. *Annals of the Cape Provincial Museums* **2**: 190–205.

Tonnoir, A. L. 1920. Notes sur quelques Psychodidae Africains. *Rev. Zool. Afr.* **8**: 127–147.

——— 1922. Contribution à l'étude des Psychodidae d'Afrique (Dipt.) *Bull. Soc. ent. Egypte* 1921: 80–112.

——— 1939. Psychodidae. *In: Ruwenzori Expedition 1934–5.* London: British Museum (Natural History). **1** (4): 35–80.

Vaillant, F. 1971. Psychodidae–Psychodinae. *In:* Lindner, E. *(Ed.) Die Fliegen der Palaearktischen Region. 9d.* Stuttgart: E. Schweizerbartsche Verlagsbuchhandlung: 1–48.

——— 1972*a*. *Ibid.*: 49–78.

——— 1972*b*. *Ibid.*: 79–108.

——— 1974. *Ibid.*: 109–142.

——— 1975. *Ibid.*: 143–182.

——— 1976. *Ibid.*: 183–206.

——— 1978. *Ibid.*: 207–238.

——— 1979. *Ibid.*: 239–270.

——— 1981. *Ibid.*: 271–310.

——— 1982*a*. Quelques précisions au sujet de cinq genres de Psychodidae Psychodinae (Diptères). *Trav. Lab. Hydrobiol.* **74**: 211–217.

——— 1982*b*. Les tribus de la sous-famille des Psychodidae Psychodinae (Diptera). *Nouv. Rev. Ent.* **12**: 189–194.

——— 1983. Psychodidae–Psychodinae. *In:* Lindner, E. *(Ed.) Die Fliegen der Palaearktischen Region. 9d.* Stuttgart: E Schweizerbartsche Verlagsbuchhandlung: 311–358.

Wagner, R. 1977. Zur kenntnis der Psychodiden fauna des Allgäus (Diptera, Nematocera). *NachrBl. bayer. Ent.* **26**: 23–28.

——— 1978. Neue europäische Psychodiden (Diptera: Psychodidae). *Senckenbergiana biol.* **58**: 157–170.

——— 1979. Moth-flies of a Central African mountain stream (Diptera, Psychodidae). *Aquatic Insects* **1**: 55–63.

——— 1982. A generic synonymy within Psychodidae (Diptera). *Aquatic Insects* **4**: 80.

——— 1983. On some Psychodidae (Diptera: Nematocera) from Senegambia. *Ent. scand.* **14**: 98–100.

Wagner, R. & Salamanna, G. 1984. Psychodinae of Sardinia. III. Further records and descriptions of new species. *Boll. Soc. ent. ital., Genova* **116**: 47–55.

Wagner, R. & Vaillant, F. 1983. The *Atrichobrunettia* (= *Mirousiella*) (Diptera, Psychodidea) from Europe. *Aquatic Insects* **5**: 157–162.

Wootton, R. J. 1979. Function, homology and terminology in insect wings. *Syst. Ent.* **4**: 81–93.

Date received: 10 December, 1986.